Dr Thornton

THE

WASHINGTON
QUARTERLY MAGAZINE.

VOL. I. JULY, 1823. No. 1.

Price One Dollar. Subscription for the year, Four Dollars.

CONTENTS.

	PAGE.
DEDICATION,	iii
Internal Improvements,	5
Potomac Canal,	7
Chesapeake and Delaware Canal,	29
Encouragement of Manufactures,	30
Steam-Boats,	32
SPECIFICATIONS OF PATENTS.	
Distilling by Steam,	47
Kiln for drying Grain,	48
Bridle for stopping Horses,	49
Apple Cider,	50
Splitting Knife,	52
Improved Hames,	53
Grain Cradle,	ib.
Preserving Bee-Hives,	55
Fire proof Furnace,	56
Grass Bonnets,	ib.
Extract of Tannin,	57
Isinglass,	58
Woods' Nursing Chair,	58
Tinning Lead,	59
Planking Vessels,	60
Lamps,	61
Water proof Boots and Shoes,	62
Blocks and Wedges,	ib.
Saddle Trees, and Horse Shoes,	63
Forge hollow Fire,	64
Bender's Canal Locks,	ib.
Transferring Impressions,	65
Refrigerator,	ib.
Dr. McWilliams' Ship's Guage,	67
New method of Fermentation,	71
Double Lock for Canals,	77
Story for the Ladies,	78
Obituaries &c.	85
Meteorological Reports.	95

WASHINGTON CITY:

PUBLISHED AND SOLD BY PISHEY THOMPSON AND DAVIS AND FORCE, WASHINGTON CITY; JOSEPH MILLIGAN, GEORGETOWN, D. C.; E. J. COALE, BALTIMORE; ABRAHAM SMALL, PHILADELPHIA; WILEY AND HALSTEAD, NEW-YORK; OLIVER EVERETT, BOSTON; JOSEPH GALES, RALEIGH, N. C.; AND JOHN MILL, CHARLESTON, S. C.

S. A. Elliot, Printer.

1823.

PU

THE

WASHINGTON

QUARTERLY MAGAZINE

OF

ARTS, SCIENCE AND LITERATURE.

WITH ILLUSTRATIVE ENGRAVINGS.

ROBERT LITTLE, EDITOR.

Knowledge is Power.....Bacon.

VOLUME I.

WASHINGTON CITY:

PUBLISHED AND SOLD BY PISHEY THOMPSON AND DAVIS AND FORCE, WASHINGTON CITY; JOSEPH MILLIGAN, GEORGETOWN, D. C.; E. J. COALE, BALTIMORE; ABRAHAM SMALL, PHILADELPHIA; WILEY AND HALSTEAD, NEW-YORK; OLIVER EVERETT, BOSTON; JOSEPH GALES, RALEIGH, N. C.; AND JOHN MILL, CHARLESTON, S. C.

S. A. Elliot, Printer.

1823.

AP2
W27

THE LIBRARY
OF CONGRESS

DEDICATION.

To the President, Vice President, and Members of the Columbian Institute.

GENTLEMEN,

THERE is no association of persons, to whom a work having the objects in view stated in the prospectus, and exemplified in this first number, can be more properly dedicated than to you. The avowed and exclusive design of the Columbian Institute is, "The promotion of Arts and Sciences." In this still infant metropolis of a mighty empire, you have first volunteered yourselves as protectors and promoters, of that on which the strength, and greatness, and happiness of every nation depends. Enjoying the inestimable advantages of the greatest degree of civil and religious freedom, that was ever possessed by any people, you know that nothing but the diffusion of knowledge, and the constantly progressive improvement of your country, can insure the stability and permanence of those wise and liberal institutions, of which we so justly boast. There is no possibility of being stationary in this respect; the hour that we cease to improve we shall deteriorate. The editor may be thought presumptuous in undertaking a work of so much importance as the present, and in truth he is very conscious of incompetency to render it what he could wish, and what the state of the country requires. But he looks up to you, gentlemen, to lend him not only your patronage, but assistance also. His numbers may serve as a vehicle for you to communicate the lights of observation, experience and research, to the country at large. The shortest communications of original matter may contain hints of the greatest ultimate service; and the various

papers and documents, reprinted in this work from situations in which their existence and influence would be more limited or evanescent, will, if judiciously selected, afford a curious and gratifying retrospect, when the numerous improvements, and works now only in embryo, are fully executed; and stand proud memorials of the active virtues, and patriotism, of the present generation.

Whether in the existing state of the country, sufficient encouragement will be obtained to insure the continuance of this work, is a problem which the sale of the present number must decide. If that decision be favourable, no exertions will be wanting to render it increasingly acceptable and useful.

I am, gentlemen,

Your most obedient servant,

THE EDITOR.

July 4, 1823.

WASHINGTON QUARTERLY MAGAZINE.

VOL. I.] JULY, 1823. [NO. 1.

INTERNAL IMPROVEMENTS.

A STRANGER in this country, thrown at once into the scene of collision which the Halls of Congress sometimes exhibit on this subject, might naturally suppose, and be staggered at the phenomenon, that there was a considerable party in the nation who thought that internal improvement was neither necessary nor desirable. What, he would say, is it possible that any civilized race of people can be hostile, or even indifferent, to the advancement of their own country in whatever facilitates mutual intercourse with all its parts, and tends to increase its wealth and comfort? A little further acquaintance with the subject, however, would undeceive him, and dissipate his surprise. He would find that the dispute, whether in the debates of our Legislature, or through the medium of the press, is not whether the nation needs internal improvement, nor whether it is right to use the utmost zeal in effecting such improvements, but it arises from different views of the Constitutional power of the General Government to interfere in this matter, or whether it is designedly left to the distinct local governments of each separate State in the Union. Also there are, as might be expected on such a theme, various opinions as to the necessity or preferableness of this, or that particular scheme of improvement; and some local and conflicting interests, as in every large country, will throw obstructions in the way of almost every object that can be proposed. But these considerations are for the most part what we denominate *political*, and as such exclude them from our work. We propose to treat not of rights but of facts. By whomsoever it is recommended or done, we shall notice all national improvements, and all that comes within our knowledge which we think tends to national improvement. And in the outset we avow our opinion, that whatever makes the country easier to travel through, facilitates the transport of goods from one part to another, increases its products, whether natural or artificial, from its own resources, and furnishes the means of supplying its own wants in all the great articles of human comfort, without absolute dependence on the precarious condition of other nations, must be considered national improvement. It is also obvious that the advancement of any of the three great branches of human industry, agriculture, commerce and manufactures, is for the advantage of the nation; and indeed they run into one another, and are mutually assisting in their prosperity, and sympathetically languish in their decay. The manufacturer, by his inventive genius and practical diligence, provides the utensils and machinery, with which the agriculturist tills his land, secures his crop, and prepares it for the various applications to which it is des-

tined. Moreover he furnishes the farmer with clothing and various conveniences, in exchange for bread, without which himself and his family could not live. But as in a prosperous state, the agriculturist will probably grow more than himself and the manufacturer can consume; and the manufacturer will convert more raw materials into fabrics, than himself and the agriculturist want; their exertions provide employment for a third class of labourers, who will carry the products of both to such markets, as the wide world opens to receive and reward the joint industry of the three.

In order to raise the agriculture of the nation to the highest pitch of improvement, to make manufactures perfect and profitable, and to remove every obstruction that can be obviated from the paths of a productive commerce, we must have good roads through every part of the country; bridges of the best construction built over our rivers; canals cut where it is desirable to connect large rivers, or constitute water communications with the interior; labour-saving machinery must be invented, made and applied in a thousand forms; and in fact, the whole population must in one mode or another be set in action for the good of the great community.

It is but two hundred years since our English Ancestors first settled on these western shores. Nature then held her undisputed dominion over the whole northern continent of America. Her rivers flowed in silent majesty through boundless forests, whose impervious shade hid their meanderings, from the foot of the mountains to the very edge of the ocean, into which they continually poured the watery tribute of a quarter of the Globe. England had at that period been in a state of slow progressive improvement for eight hundred years from the time of Alfred, who first compelled the chiefs of that country to educate their children, and to enable them to do so founded the University of Oxford; he also divided the kingdom into Counties and Hundreds for the purposes of effectual government. The circumstances and character of the two nations, though sprung from the same stock, are in various respects very different; but if we suppose the internal condition of the Atlantic States, in regard to those things principally contemplated in this work, if taken on the whole from North to South, to be equal to that of England at the time the first settlers here left it, then America has made progress in *two hundred* years, equal to England in *eight hundred.*

If she continue to advance in the same ratio of improvement, her roads, canals, agriculture, manufactures and commerce, should in fifty years more, be what England in these respects, is now. The nature of her free institutions is such, that we see no reason to doubt that this will be the case. Only let the press, that mighty engine for influencing the public mind, be freely and wisely employed to inform the country what is to be effected; point out the resources it possesses in itself, furnish information concerning all the modes of abridging labour, shortening the road to wealth and comfort, increasing the conveniences of human life, and the productiveness of nature and art, and the work will be done. Why is it that the progress of modern nations in every branch of useful

knowledge is so inconceivably rapid, compared with the slow growth of ancient Europe in the arts of civilization?

The answer is simple and satisfactory. The art of printing, and the habit of reading, have done all. Here we have the talismanic wand which as by enchantment, lays forests prostrate, throws splendid arches over rivers that impeded man in his labours, builds great cities, raises the fanes of religion, and the palaces of justice, and the abodes of science in every part of the country. It is this that makes the farmer capable of doubling and quadrupling the production of his lands, and the manufacturer of supplying the most useful, ornamental, abundant and cheap fabrics for every purpose of domestic and social life. It is this that lends wings to commerce that she may fly to the ends of the earth.

The proprietors of this work, humbly offer their services to the public to promote these great national objects. Their pages will be always open to well written communications on any of the subjects which lie within the limits prescribed by their prospectus; and having access, by permission, to the records of Patents issued by the Government of the United States, for important inventions and discoveries, they will be able to furnish in that department of the work, information of the highest importance to the nation. It must be understood by our correspondents, that every communication must be at the absolute disposal of the gentleman who has undertaken the editorship, whether to publish it or not: and under this condition he earnestly solicits communications from intelligent persons in every state of this Union, on topics suited for our quarterly report of events and observations, classed under the head of each state; of which the present number furnishes an imperfect sample.

POTOMAC CANAL.

We cannot present our readers with a more interesting document, in the first number of our work, than the Report of the Commissioners, appointed by the Legislatures of Virginia and Maryland to examine the subject of the navigation of the Potomac river, &c. This luminous and satisfactory report will form, probably, the basis of a work, which in a national point of view, yields in precedence to none, projected in this or any other country. In further illustration of the practibility of carrying the canal completely through the dividing ridge of the Alleghany Mountains, the editor refers to another paper in this number concerning the construction of the double locks—on the Regent's Canal in England. It is a plan of lockage exceedingly simple and less liable to deterioration than any other we have yet seen, and the passage of two boats, require only the escape of one lock-full of water, which is a saving of half the usual quantity, a consideration of great importance on the glades of the Alleghany Ridge.

EXTRACT FROM THE REPORT OF THE COMMISSIONERS OF MARYLAND AND VIRGINIA, TO THE EXECUTIVES OF THOSE TWO STATES

The Commisioners appointed by the law of Virginia and the resolutions of Maryland, of the year 1821, jointly to examine the affairs of the

Potomac Company, the state of the navigation of the River Potomac, its susceptibility of improvement, and to make report whether the said company had complied with the terms of its charter, granted by the two states, and its ability to comply within a reasonable time, and whether any, and what, aid should be given to the said company, and what would be the best means of effecting an improvement in the navigation of the said river, report:

That, in compliance with the injunctions of the two states, they did assemble in Georgetown, on the 2d day of July last, and commenced the discharge of their duties, by examining the affairs of the Potomac Company; and it appears the company had not only expended the whole of the dividing stock, but have incurred heavy debts, which their present resources can never enable them to discharge; nor is it reasonable to expect, in such circumstances, that they can ever effect the objects of their incorporation.

The provisions and special conditions of the charter and laws of the two states, then occupied their attention, previous to the examination of the works which had been executed under the direction, and at the expence, of this company, on the river. From the best consideration which they could give the subject, it appears to the commissioners that the Potomac Company have failed to comply with the terms and conditions of the acts of their incorporation.

The right to take tolls, and all other privileges, were granted them on condition that the navigation of the river should be completed within a given specified time, which has been variously extended by subsequent law, and finally expired, under the Maryland law, on the 1st of Jan. 1823; and under that of Virginia, on the 1st of Jan. 1820. That the navigation required to be effected, was such as should "render the river well capable of being navigated in dry seasons, by vessels drawing one foot water," that, upon an application by the Potomac Company to the Legislature of Virginia, in 1802, for an exposition of the words "dry seasons" that the Legislature declared, that those words, as used in the charter, were to be intended and understood "all seasons;" an interpretation of which the correctness cannot be well questioned. From an actual measurement of the depth of the river, by the commissioners, it was ascertained that, at the time of their examination of it, there was not a sufficient depth of water for the navigation of boats drawing even six inches. It is true that, at their session of eighteen hundred and two, the Maryland Legislature past a law, founded on the idea that the Potomac Company had accomplished the object of their incorporation, confirming to that company all the rights and privileges conditionally granted in the charter. But it is extremely apparent, that to absolve from an obligation, requires equal or paramount power to that which imposed it, and of course, neither Virginia nor Maryland could, singly, release a condition, which the Potomac Company had bound themselves to both to perform. The act of the Maryland Legislature can, therefore, only be considered as nugatory; and, indeed, that Legislature itself seems so to have considered it; for, in the year 1809, seven years after the

passage of the confirmatory act, it passed another law, extending to that company the time of completing the navigation of the river. The commissioners, upon full consultation, do not deem it prudent or expedient to give further aid to the Potomac Company; the only alternative, therefore, that remains, is to divest them of their charter, and adopt some more effectual mode of improving the navigation of the river; nor can this procedure be regarded as harsh, when duly considered; the law, and justice of it, it is presumed, have been made manifest. Will it be an injury to the stockholders? Look at the exposition of their affairs, furnished by the company itself; see the annual amount of their tolls; and in the present defective state of their navigation, which they have no means of improving, can it ever be increased? Deduct from it the expense of repairs and contingencies, as salaries to clerks and toll gatherers, and then compare it with the amount of their debts, or even the annual interest of those debts, and visionary indeed must be that man who can expect ever to draw a cent of profit from such stock, with such resources. Can such debts ever be redeemed? The fact is, the Potomac Company are precisely in the situation of all other chartered companies who fail in their undertakings; their expected profits have eventuated in loss and disappointment.

It is due, however, to that company, to state, that, although the errors under which they labored in the principles and practice of improvements in navigation have been great, and have caused a useless expenditure of large sums, still, they acted with the best lights heretofore possessed by the best informed persons in our states. They have not only expended the whole of their original stock in attempts to improve the river; but nearly all their tolls, with the exception of their necessary annual expenses, have been appropriated to the same purpose. And this failure to accomplish the objects of their incorporation may be fairly attributed to a want of information on the subject at the very early period of our existence as a nation, when that company was formed.

THE PRESENT STATE OF THE NAVIGATION.

It has been stated, and is believed by many persons, that the river Potomac, in its present condition, is navigable nearly half the year. The Potomac Company are required to give a low water navigation, of a foot deep, throughout the year. This circumstance, and the idea entertained of the possibility of confining the waters in the bed of the river to narrow sluices, have confirmed this opinion. The commissioners have given a minute examination of this branch of the duties imposed upon them, and satisfied themselves, from their own observations, and the most careful enquiries, that no such blessing is enjoyed by the fertile districts through which the river flows.

The floods and freshets give the only navigation at present used. They occur usually from the 1st September to the 20th June, variously, however, in various years. And it so happens, that, although boats are known in some years, to pass down, through each of the months intervening between these dates, yet, in consequence of the ice, during

winter, and the short continuance of a flood giving navigable water, the average duration of the boating time, in a course of many years, does not much, if at all, exceed eight or ten days passable water for full loaded boats, late in the year, and from twenty-five to thirty-five days in the spring of the year, making the whole time, when produce and goods can be stream-borne, in the course of one entire common year, from thirty-three to forty-five days. The duration of this period necessarily increases as you approach the Great Falls, and decreases as you ascend to the head of the river. The evils attending the present state of the navigation lessen the benefits which might be supposed to be derived from even this short period. They chiefly consist in its uncertainty and dependence on the vicissitudes of the seasons; in the great rapidity of the current of the river, in consequence of the great fall or inclination of its plane, in proportion to its length; in its dangerous character, arising from the wildness of the torrent, and the suddenness of its courses and meanders—having worn its devious way, in the lapse of ages, through countless ridges of rocks and mountains, and, in consequence of huge fragments of rocks and large loose stones, the remains of the wasted mountains, scattered thickly, and in some places rising over the entire bed of the river, and leaving no passage for loaded boats, impelled by the rapid and impetuous current, but what may be found by warping and winding, with the utmost exertion of strength, agility and watchfulness, on the part of the crew, through a most irregular course. By these dangers, many boats and cargoes are destroyed. The uncertainty and the shortness of the duration of the floods are the very worst features in the character of this navigation. This uncertainty frequently occasions the most ruinous disappointments to the farmers, millers, and merchants. The expected rains are often denied, and the consequence frequently is, that contracts cannot be complied with, which occasion loss and ruin. Sometimes, a small rise, and deceitful appearances, induce a collection of the scattered crews of the boatmen from the mountains, and a general shipment of produce; by the time they have descended forty or fifty miles down the river, a fall in the water takes place; the boats are compelled to stop, and their storage, increased expenses, neglect of agents, and natural causes, waste the profits or damage the produce of all concerned. This chiefly occurs in the upper part of the river. Sometimes the rains come on sooner than they are expected, and the rise and fall on the river succeed each other before the farmers are prepared to make their shipments; then the crops lie on hand till next year, subject to all the inconveniences and losses accompanying such circumstances. And when the floods are most propitious, and navigation is the best, under existing circumstances, the usual consequence is, that the produce of immense districts of country, among the most fertile in the union, is all forced into market at one time, and a capital which might be sufficient to give better prices, if the merchant had time to receive the proceeds of one investment, before he had a second, is found inadequate to give a fair price, to all, under such disadvantages. Thus, the farmer has frequently no alternative left but to sacrifice the fruits of his year's labor. The expenses are already too

great, and produce will bear no additional cost or risk of shipping farther; and, to carry it home again is impossible; for sometimes, even the boat which brought it down, cannot be floated back empty. It is surely to be lamented that, wretched as is this navigation, it is the the sole dependence of a vast extent of country, which, in spite of its fertility, and the value of its inexhaustible minerals of the most useful kind, is most evidently drooping and suffering, for want of a ready market for its productions, without which stimulus it is impossible for its agriculture to flourish, or its natural resources to be developed.

Bad indeed as is the navigation above described, still this conveyance is preferred, by all who can avail themselves of it, to land carriage. With all its uncertainties and risks, it is found cheaper by all the farmers and millers than maintaining supernumerary horses throughout the year, for the purpose of carrying produce to market. If additional proof were required, a stronger cannot be adduced than this very circumstance of the immense superiority of navigation over land carriage. If navigation, encumbered with so many risks and uncertainties, and unavoidable expenses, is still preferred by all who can avail themselves of it, to the usual land carriage, assisted by improved roads, to all the sea-ports; and if this, the worst and dearest of all kinds of navigation, does yet give an increased value to the lands contiguous to it over those whose sole reliance is in the turnpike, what may we not reasonably calculate will be the still further increased value of the lands afforded by a safe and constant still water navigation?

SLUICE NAVIGATION.

As what has been called sluice navigation has been the kind adopted by the Potomac Company, and the one on which so large a part of their funds has been expended, it may be necessary to give an explanation drawn from actual observation of what has been done and tried for many years, of this kind of work on the Potomac.

The sluices on this river are of three kinds; the first, which are chiefly found in the upper part of the river, are channels formed by low wells. The second are channels formed by excavating the rocky bottom of the rivers. The third kind which are yet used, and have been of service to the navigation in high water, are channels opened near the banks of the river, around the rapids and small falls in the current, as at Harper's Ferry, Payne's Falls, &c. to avoid the great force of the torrent in mid stream, in such situations and with the view of giving the boatmen a land path, on the bank, on which by a rope they may drag the boat up the stream, when the violence of the current is too great to be overcome by setting poles. These channels, though used, are of very imperfect and temporary construction, the bottoms of no one of them being graduated. They are certainly too imperfect to be called canals, although such is their common appellation. The two first of these kind of sluices are formed on erroneous principles, and have failed to render any service to the navigation of the rivers. The errors in the first requiring detail, will be presently explained. The errors in the

second kind, or in excavating channels in the bottom of the stream, consist in attempting on a long line of a stream, inclining all the way in its whole length, to regulate the depth by partial cutting or deepening the bottom. Unless you bring water to a level the whole length of the line of its stream, any partial cutting or deepening in spots along the line, so inclined, only serves to transpose a shallow a little further up the line, or to make hollow basins, of no service. And in a river where the chief failure in its navigation arises from the too long and too frequent deficiency of depth of water necessary for boating, owing to the great inclination of the plane of its stream, and to its consequent rapid discharge of water, if you smooth the plane by removing all obstructions, the rapidity will of course be encreased, and the sooner will the deficiency in depth be felt. The low dam, or walling plan of improvement, though the opposite in its effect to the one described, and not so radically erroneous on the general principles, is no less so in its application to such a river as Potomac. To make this manifest, some detail of the circumstances in which they are used and placed is necessary. The ruins of this kind of work are to be seen some distance above Cumberland, not, however, reaching to Savage river, and extend, at greater or less intervals, to where the general depth of water is considerably increased, becoming more and more rare as the water is more abundant. They consist in low dams, running across from shore to shore, elevated about 18 inches or 2 feet from the bottom, and made of rounded stone, picked out of the bed of the river, of a size that a man can conveniently handle, the greater part not larger than a man's head, and raised on a broad basis of from ten to twenty feet in width. This transverse low wall or dam is usually connected with two walls about the same height, but built on a narrower basis of from six to eight feet, placed parallel to each other and to the shores, at the distance of 20 feet from each other, through which passage, by a gap in the transverse dam, it is intended to force the current of the river, and to deepen the waters by collecting it into this artificial channel. The number of these transverse walls, connected, as stated, with 20 feet sluices on the river, is very great, but it was not thought necessary to count them. Indeed, in such a state of ruin were the greater part of them found, that they were difficult to be distinguished from the numerous fish dams found along the whole course of the river. A few, but enough of them, were in a sufficient state of preservation to be examined, and to afford the means of ascertaining how far they were calculated to answer the ends intended. The commisioners are not prepared to say what might be the effect of this kind of walling on other rivers, but they are well assured that the river Potomac cannot be usefully confined by such contrivances, even if they were made in the best manner of which that kind of walling is susceptible. The bottom of this river, which forms the drain of a mountainous region, of such wide extent, is very unequal in its level, and abounds in shallows and basons, according to its obduracy or softness, and to the increased or diminished force of the current; sometimes weakened by expanding in widened plains, or in the formation of islands; sometimes increased by contraction between mountains and

rocky banks, and above all by its flowing so rapidly, in consequence of the greatness of its fall compared to its length. The result from such circumstances, on this kind of work, situated in the bed of such a river, is, that these walls cannot be made sufficiently permanent, and if they could, so very many of them would be required to attain even a trifling depth, that the benefit would be infinitely too dear, or an absolute waste of money. These walls, from their nature, cannot be tight, but if they could be made so, and the whole body of the water in such a river, could be confined to a channel of 20 feet, the velocity of the current rushing through these short channels, with full room to spread after it has passed, would be increased in proportion to its confinement. And the whole volume of water in the river, in the summer and dry seasons, especially above the south branch, would not be sufficient to give the depth required by boats of sufficient size to be useful in transportation. Where the quantity of water in this river is much increased by the larger tributaries, in order to give 18 inches depth, and less would be of no use, it would be necessary to continue the parallel walls much farther than they have ever yet been attempted, so as to give them a length sufficient to reach over the whole extent of continued shallows, which were found, in places, to cover 3 or 4 miles. The effect of lengthening the sluice walls would be in some measure to lessen the velocity, and of course to increase the depth of the current, but the evils are much too great to be usefully remedied by the small effects which could be produced by these means, if it were practicable to give durability to walls so built, and so placed. Walls of this kind, when drawn so long, and winding and bending as would be necessary to follow the course of the current, would be objectionable for other reasons, independent of the increased cost and increased liability to destruction; such as the extreme difficulty of guiding a boat with sufficient accuracy in these narrow confined torrents so as to prevent her striking and bilging against or over the side walls in descending,* and in ascending them, her progress would be very much retarded by the increased force of the current consequent on its confinement. Now, on the supposition of a large proportion of the distance being so confined, many weeks would be added to the length of time consumed in a trip to and from market, already inconveniently long. In some places capstans would be required, to be placed on the banks, to overcome the opposing power of the current. For these reasons, and from the experience already had of the perishable nature and trifling utility of this sort of work, it appears that it would be idle to attempt any thing in future of this kind.

LOCK AND DAM NAVIGATION.

Another mode is by some relied upon, to improve the navigation of this river, in consequence of its supposed greater cheapness, than a canal,

* The greater part of the wrecks which of late years have occurred, according to information, along the rivers, were in consequence of the boats being dashed against the sluice walls.

properly so called, and consists in deepening the water in the bed of the river, sufficiently for the purposes of navigation, by high dams of large stone and solid construction, with a lock or two locks to each dam, and a short canal, for the purposes of descending and ascending each level.

This mode has many and great inconveniencies inseparable from it; the most important objection to it, is the great expensiveness of the kind of navigation which alone it affords, that is, in boats managed by men, instead of boats drawn by a horse; besides this general objection, many reasons may be adduced to shew why it cannot be advantageously adopted on the Potomac river; the general width of this river is too great, the fall is also too considerable, and the alluvial margins which alternate from the right to the left bank of the river, the whole length of its course to tide water, and which vary in elevation from fifteen to thirty feet, would, in high water, without enormous expense, form insecure abutments to the dams; this kind of margin being formed of loose earth, of comparative recent formation, would, when obstructions are placed in the bed of the river, be liable to be forced and washed away at the extremities of the dams; the dams themselves, although ever so solidly built, would require frequent repairs; the fall in the river from Cumberland to tide water being about 537 feet, would require about 53 dams, as the banks would not admit of a greater elevation being given to the dams than 10 feet, without great risk of damaging the marginal property, and of increasing the liability to frequent injuries to the dams themselves:* each dam would require a lock of the same lift as the dam, and also, an entering canal, with a guard lock of considerable elevation, to be used in high water; add to these, the danger of being thrown by the current over the dams, however judiciously located below the guard lock, and the inconveniencies which would arise in high water; taking all these disadvantageous circumstances into the account, consider the number of dams, locks, &c. and their great length, from 100 to 800 yards, and the necessary solidity required in their construction, and then calculate the other incidental expenses, the whole amount would be nearly equal to the cost of a regular canal, and the advantages would be infinitely less. Upon a full view of the different plans, therefore, it cannot, for a moment, be doubted, but that the adoption of a regular canal out of the river, though following its ravine, will be the most useful and durable improvement, and when the advantages and cost of each mode are relatively considered, incomparably the cheapest. The canal, which, under all circumstances, the commissioners have thought best calcualted to suit the localities of Potomac river, on which our estimates are founded, is one 30 feet wide at top, 20 feet at bottom, and 3 feet deep; the earth to be thrown out next the river, to form a tow path, elevated two feet, or thereabouts, above the level of the water in the canal, and the track of the tow-path to be 10 feet wide. The level of the canal to be generally elevated above the highest floods,

* Lock and dam is the kind of navigation adopted on the Schuylkill river, but that is a small narrow river, with high banks; and much damage, it is said, has been done to marginal property, in consequence of the dam.

except when it is found necessary to take in a supply of water from the river, or to pass expensive ground along a rocky shore; thirty feet, it is supposed, is the necessary width to admit the passage of two boats, of sufficient size to carry 25 tons, and to admit of a small platform on the bow of the boat, sufficient to take a horse in upon, as that, in two places would be necessary, where it has been found expedient to cross the river, by means of a dam to avoid too expensive cutting or walling. In order to ascertain the practicability and cost of this plan, the commissioners have had the assistance of the late engineer of the state of Virginia, on whose sound practical judgment and knowledge, entire reliance may be placed, more especially after the test his estimates have undergone, on that part of the James river, where part of the canal he had designed has been completed.* And it has has been there found, that contractors and undertakers in sufficient number can be obtained from various parts of the United States, to undertake the works at the estimated cost, whenever the states think proper to authorize the cutting of a canal. The report and calculations on this plan, made from Mr. Moore's field notes, by Mr. Isaac Briggs, who has been appointed his successor, as far as we proceeded before the adjournment, occasioned by the serious sickness of the greater part of the commissioners, and of the engineer, and surveyors, that is, about half a mile below Goose Creek, and since to tide water, are herewith presented, and shew the utmost probable cost of such a canal for that distance; plats of the courses of the river and canal will likewise accompany the plan and calculations, and all be hereto annexed.

The commissioners have endeavored, in their examination of the manner and costs of improving this river, to take as complete a view of the subject as circumstances would permit, so as to present to the legislature such a representation, as would enable them, without losing sight of the ulterior advantages which must grow out of a canal so located, and out of the consequent future ramifications and extension of which it will necessarily be the parent, as to be able to shew, not only the entire cost of the undertaking as far as the national road at Cumberland, but the cost of so much as may now appear within the limits of the ways and means of the two states. With this view, they directed the engineer, in the outset, to make his calculations of the surveyed route in sections, so as to shew the whole costs of each section, from one important point to another, along its whole course. This they supposed would place the commencement of this great work completely within the reach of the resources of the states, as, whether the canal commenced for the present at Cumberland, and descended the river where the greatest obstructions to navigation are found, as far as William's Port, or at tide waters, and ascended the river, every section, when completed, would add to the value of the commerce and soil of the states, and therefrom something would at once be received in tolls. The level and sur-

* Mr. Isaac Briggs, the present engineer was himself a contractor for the cutting of a part of the James River Canal, which has been completed, and can, experimentally, attest their correctness.

vey of the whole course, being once ascertained and decided, any part of the work likely to afford the greatest benefit and profit might be completed in such a manner as to be united with the remainder without addition of cost, or any derangement of the plan. This partial cutting in sections, would enable the states to keep their expenditures within reasonable bounds, and to guard against the necessity of oppressive burthens; at the same time that they would lay the foundation of an improvement, which, when extended across the mountains and completed, it is no vain boast to say will be of greater importance than any other of which the topography of the United States is susceptible.

The territorial feature of the United States, which is most important to all our relations, political, commercial, and social, is the extensive range of mountainous region which divides the rivers falling into the Mississippi, from those which fall into the Atlantic ocean. It forms a wall of separation between the west and east, and the difficulties it presents has diverted the western commerce from the nearest seaports, and caused its general current to seek distant outlets around its southern and northern extremities. Such, however, is the wise arrangement of Providence, that, where the evils resulting from this great barrier operate most severely, that is nearest to its centre, it has placed the remedy within our reach. Of all the rivers which reciprocally drain the lands beyond and on this side the mountains, the Ohio on the one side, and the Potomac on the other, extend their ramifications, of which any use can be made, nearest to the summit and level of the dividing ridge. Such also is the favorable shape of the mountains at this point, where these waters appproach nearest, that its flattened surface forms extensive and luxuriant meadows, called glades. A well known operation of the laws of nature, at this elevated point, at all times many degrees cooler than the surrounding air, condenses the vapors and attracts the clouds rising on either side of the mountains, so that these elevated plains or glades in the driest season are copiously supplied with water, and afford rich and abundant pasturage, when all the valleys below them are parched with drought. Deep Creek is a western stream falling into Youghagany, which forms in these glades, and is situated at that point from which the commissioners commenced their measurement, within two hundred and four feet of the summit of the dividing ridge; and can be brought by a cut within two miles of a branch of Savage river, called Crab-tree run, at the junction of its branches at Swan's old mill, on this side of the mountains. Deep Creek is a copious stream with the banks nearly perpendicular, running through the soft earth of the glades, and was in the season when they examined it, (supposed to be the driest which occurred within the memory of most men living,) from 3 to 4 feet deep, and from 9 to 12 feet wide, with a current of about one and an half miles to the hour. There is a narrow* pass in a ridge of the glades, through which Deep Creek makes its way; where, by erecting a dam fifteen or twenty feet high, and not more than

* Called Hoophole Ridge.

forty or fifty yards long, these meadows may be inundated, and an immense pond may be formed equal at least to three or four miles in length, and half a mile in breadth. This reservoir, it is believed, would furnish sufficient water for locks, and a canal, if carried through the dividing ridge by a tunnel two miles long, to descend and ascend both sides of the mountains, to the Mononghela on the west, and to Savage river on the east, especially when recruited, as you descended by Big Youghagany on the west side, and by Crab-tree run, on the east side, respectively. The fact was not ascertained, but from the position of the sources of Little Youghagany, it is believed they might easily be conveyed into the same reservoir.*

Sufficient attention has not heretofore been paid to the invaluable supply of water afforded at this elevated point, by the principles of attraction and condensation. Whenever mountains present a flattened surface near, or at their summit, of any extent, sufficient to prevent the rapid waste of water, which steeps occasion, they generally possess all the qualities of the best meadow land. Mr. Gallatin, in his masterly report on the roads and canals of the United States, has entirely overlooked the consequences of this operation of natural causes at this point; and asserts, from the supposed absence of such a resevoir, the impracticability of uniting the western and eastern waters. His words are these: "the impracticability arises from the principle of lock navigation, which, in order to effect the ascent, requires a greater supply of water in proportion to the heighth to be ascended, whilst the supply of waters becomes less in the same proportion." "Nor does (says he,) the chain of mountains through the whole extent, where it divides the Atlantic from the western rivers, afford a single pond, lake, or natural reservoir." In this assertion, happily for posterity, this eminent statesman is substantially mistaken; and it is highly satisfactory to know that this grand desideratum can be found, and that whenever the resources of the nation are deemed sufficient to undertake the magnificent labor, of perforating the great barriers of the east and west, by the short tunnel required, water will not be found wanting for canaling purposes. The want of the necessary supply of water is the main consideration; and next, whether the objects to be attained are worth the expenditure required. Mr Gallatin, in another part of this report, justly remarks, "Nor should the plan, on account of its magnitude, be thought chimerical; for the elevation, and other natural obstacles of intervening ground, or want of a sufficient supply of water, and not distance, are the only insuperable impediments to an artificial navigation.†

* These glades, and this slowly gliding stream, were to us surprising objects, elevated as they are, and situated among the spurs, or lateral ribs, of the Little Back Bone mountains, which have but a small rise above these natural meadows, and exhibited to the eye, fatigued with the severity and rudeness of the face of nature, in the tedious ascent to their elevated plains, an appearance no less delightful than unexpected, of an open level country, clothed with flowers and rich verdure, intersected with gently rising hillocks, crowned with trees, not thick or impervious to the sight, nor continued along the combs of these low hills, but detached in clumps, presenting the pleasing delusion of an improved and ornamented country.

† The following extract from Mr. Hamilton Fulton's report, to the board of public

The route for a canal from Cumberland to the Monongahela, across the mountains, and its practicability, are so intimately connected with the canal at present contemplated, that it necessarily blends itself with every view of the subject. It was for this reason, that the work was commenced at Deep Creek, the better to judge of its practicability and of the reasonableness of the consequences expected to arise from opening the canal navigation, as far as now recommended. The sections across the mountains to the states of Virginia and Maryland would at present undoubtedly be an undertaking beyond their ordinary means. But to the states of Ohio, Kentucky, Pennsylvania, Virginia, and Maryland, who are all immediately concerned, it might not prove so, and certainly not to the United States, who are no less, deeply interested in its accomplishment, upon political considerations involving our dearest interests of internal strength and security in war, of commerce and revenue, and the preservation of the union. Of its practicability, it is believed little doubt can exist, as the necessary supply of water can be found. The cost of the lockage and tunnel are the only real obstacles. When the practicability of a line of canal is ascertained, where a doubt can at all exist, as to the relative preponderance, it is the province of prudence, previous to the adoption of an expensive plan of improvement, to weigh in the scale of computation the cost and labor against the advantages expected to be derived therefrom. The cost of the section of a canal from Cumberland to Monongahela, although it will, whenever the estimate is made, be found comparatively much greater than on lower levels, yet will fall far short of what an inexperienced public have heretofore imagined. But on the other hand, who will undertake to enumerate the advantage and growing profits on the trade of the only canal, which is practicable between the waters of the Ohio and the Chesapeake? It is only necessary to see the unequalled location of this central route; the length of the barrier of mountains which it would sever; the boundless region of the north western states and territories, and the extent, literally unparallelled on the globe, of the already connected inland navigation by means of the great lakes and collossal rivers to be united with Potomac, and to consider the greater distance and expense

works of North Carolina, for the year 1821, page 22, will give you an idea of the operation of locks on canals, and of a new method of *saving the waste of water*, so precious at great elevations, by means of basins, or ponds, arranged in a particular manner, where many locks are necessary to surmount considerable elevations. Mr. H. Fulton is an engineer of celibrity, induced by North Carolina to come to this country from England. Extract: "Although I do not approve of more locks than one being built at one place, yet the work, &c. Double, treble, quadruple, &c. chains of locks cause much detention and waste of water, as the followiug examples will shew, viz. If a boat has entered the upper lock for the purpose of descending, no other boat can ascend until she has got out of the lowest lock, and vice versa. If a boat ascends immediately after one has descended, as many back falls of water must be drawn from the summit as there are locks in the chain and if a descending boat succeeds the ascending one, the whole of the water is lost except one lock full. Thus, an ascending and descending boat in a chain of six locks, will draw off six locks full of water from the summit, while an ascending and descending boat passing through six single locks *with ponds of sufficient capacity* between each, will draw off only *one lock full* from the summit."

of getting to and from other markets on our seaboard, to be entirely satisfied that in a country increasing in population, wealth, and the knowledge of political economy, like ours, that the object to be attained in a pecuniary point of view alone, is beyond calculation; and it affords the most ample guarantee for the interest and capital that may be invested to complete it, whatever may be the amount of such investment; and cannot fail moreover to be a vast and always increasing source of revenue hereafter, either to the states through which it will pass, or to the United States, which ever may undertake it. The paramount and primordial claim of this route to public attention is evinced by the location of the national road, and also of the seat of government, and not less so by the early date of the charter of the Potomac company, immediately after the peace establishing our independence. This last circumstance shews it to have been the very first object of this nature, which engrossed the attention of Virginia and Maryland, when we had scarcely drawn the first breath of emancipation.

The manuscript calculations of our Washington, who was the father of this company, shew that, in his mind, the western trade and the improvement of the Potomac, were always intimately connected. He makes the difference between the route from Detroit, on Lake Erie, by way of Fort Pitt, now Pittsburg, and Fort Cumberland, to Alexandria, and that to New York, in distance 496 miles, or upwards of 500 miles to tide water in favor of the former.* This grand speculation of this great man drawing the commerce of the lakes, and the northwestern territories to Alexandria, requires only the union of the waters of the Ohio and Potomac, in order to be realized; and with daily increasing experience, and a full sense of the rapid advance in the value of the great prize, it cannot fail ere long to be begun and completed. It is supposed, that, when the nature of a voyage from the states north of Ohio to New Orleans, or to New York, is contrasted with a voyage to Washington on Potomac, on the supposition of the navigation being perfected across the mountains, that, in many respects the advantages will be so considerable in favour of Washington, that it will, in most instances, be preferred; this preference over New Orleans, will arise from the down-stream navigation of the rivers emptying into the Ohio, in the gentle current of the Ohio, compared with the rapid stream of the Mississippi, taking into view the time, labour, and expense of returning, as well as going to market on each route, and the effect of the climate of New Orleans, in damaging flour, and bacon, and all vegetable and animal productions, and its dangerous influence on more northern constitutions, as also, the very great difficulty and length of time it requires for ships to get up from sea to that city. Over New York, the advan-

* Manuscript calculation of general Washington. From Detroit, by the route through Fort Pitt and Fort Cumberland:

To Alexandria	607 miles.
Richmond	840
Philadelphia	741
Albany	943
New York	1,103

tages will consist in the shorter distance, and the necessity of navigating the lakes in vessels of a different construction from those used in rivers and on canals, requiring a change of hands, navigators, and the repeated removal of cargo from the one kind to the other, while the owner of a boat will be able to go and come all the way to Washingon, in most instances, with a crew of his own neighbourhood, add to these reasons the circumstance of the New York canal being closed one month longer by ice every year, than a canal on Potomac, and the superiority of this route will be manifest.*

GENERAL ADVANTAGES OF CANAL OR STILL-WATER NAVIGATION.

On a canal, such as is now proposed, a boat carrying 25 tons burthen, will be enabled to go up the river course with the same facility she goes down; the navigation on the canal will be always good, except when it is closed by ice. The present condition of the navigation of Potomac river has been explained, and the difference in these important respects is too glaring to require additional comment.

The usual load of a wagon, on our turnpikes, is stated at 3 tons; a boat, one man, a boy, and a horse, will be equal for transportation then, to more than eight wagons, eight men, and forty horses, each travelling at the same rate of distance in equal time.

"The public would be great gainers were they to lay out upon the making of every mile of canal, twenty times as much as they expend upon a mile of turnpike road; while a mile of canal is often made at less expense than a mile of road;" though commonly it has cost on recent work in this county, something more per mile; this excess has rarely exceeded a third of the cost of a mile of turnpike, locks, culverts, &c. all considered. To shew how the tolls may be increased for the benefit of a canal company, while the freight is still lessened very considerably, an example given by the late Mr. Robert Fulton is so strongly stated and clearly illustrated, that we cannot do better than insert it

* The comparison of the distances and difficulties now existing between New York and Washington, on the route from Pittsburg to both, is stated as follows:

Pittsburg to Brownsville, by stream,	60 miles.
Brownsville to Cumberland, turnpike,	72
Cumberland to Georgetown, by stream,	188
	320
Pittsburg up the Alleghany to Waterford,	160
Portage to French Creek,	14
French Creek to the canal by the lake,	90
Down the canal and Hudson to New York,	520
	784
	320
Difference in favor of Washington,	464

There is fifty-eight miles less portage to New York, but to balance this, there is one hundred miles more up-stream, and ninety miles more lake navigation.

verbatim. "By the Lancaster turnpike, from Philadelphia to the Susquehanna at Columbia, is 74 miles; on it, from Columbia to Philadelphia, a barrel of flour (say 200 weight) pays one dollar carriage; a broad wheeled wagon carries 30 barrels of 3 tons, and pays for turnpike $3; thus for each ton carried the turnpike company receives only one dollar, the making of the road cost 444,000 dollars, or, on an average of 6,000 dollars a mile; I will now suppose a canal to have been cut from Philadelphia to Columbia, and with its winding to make 100 miles, at $15,000 a mile, or for the whole $1,500,000. On such a canal, one man, one boy, and horse, would convey 25 tons twenty miles a day, on which the following would be the expenses: a man 1 dollar, a horse 1 dollar, a boy 50 cents, tolls for repairing canal 1 dollar, tolls for passing locks, &c. 1 dollar and 50 cents. Interest on the wear of a boat 50 cents, sum total 5 dollars; this is equal to 20 cents a ton for 20 miles, and no more than 1 dollar a ton for 100 miles, instead of 10 dollars, paid by the road; consequently, for each ton carried from Columbia to Philadelphia, on the canal, the company might take a toll of *six dollars* instead of *one*, which is now got by the road, and then the flour would arrive at Philadelphia for *seven dollars* a ton instead of *ten*, which it now pays; the ton of merchandise taken from Philadelphia back to Columbia, would also, pay 3 dollars less than it now pays.

Suppose that exactly the number of tons would move on the canal, that are now transported by the road; again, let it be supposed that at 1 dollar a ton, the turnpike company gains 5 per cent. per annum, on their capital of $444,000, or 22,200 dollars, consequently, 22,200 tons must be carried, which at *six dollars a ton* to the canal company, would give 133,200 dollars a year, 8 1-2 per cent. for the capital of 1,500,000 dollars."

In order to see the immediate effect of cutting a canal from tide water to Cumberland, it is necessary to ascertain the amount of tolls now taken on the roads leading from and through those districts of country, which will avail themselves of the cheaper conveyance by canal, as from Leesburgh to Alexandria and Georgetown, and from Union Town by Hagerstown, Boonsborough, Fredericktown, &c. to Baltimore and Georgetown; the tolls now taken on these roads, and also, at the Great Falls of Potomac, may be five or six times increased in amount on the canal, and still, in consequence of the great saving in freight, as above stated and exemplified, the cost of transportation to the owner of the produce or goods, will be greatly cheaper than it now is by the road.

But by far the greater part of the toll received on canals, generally, and likewise on this canal, will accrue on those articles which are too bulky to be transported to any considerable distance by roads or the present navigation. The use of these necessary, although cheap articles, is now almost wholly denied to a large inland population, and the benefits of such as the interior affords excluded from the seaboard; among these are fuel, the materials for building, and certain articles of food and domestic use; to wit—coals, cordwood, and charcoal, lime, slate, marble, iron, timber, potter's earth, and tanner's bark, Indian corn, oats,

barley, salt beef, pork, cider, fruit, tar, turpentine, &c. The supply of these articles to be obtained from the banks of Potomac and its branches, is literally inexhaustible, for which there will be a growing demand. These will constitute articles entirely new to the commerce between the interior and seaboard.

The chief articles at present exchanged by the interior with the seaboard, are flour, hemp, flax, wool, bacon, lard, whiskey, tobacco, ginseng, tallow, bees-wax, pearl ashes, live cattle, hogs, and horses.

The productions for which will be created a market altogether new, and those of the seaboard and of commerce, for which the demand will increase, in consequence of opening a canal, are, plaster of paris, salt, fish oil, fish, all the other productions of the rivers, and every kind of foreign merchandise.

The fisheries on the rivers emptying into the Chesapeake will be doubled in value; the coasting trade of the Chesapeake will be increased; ship building will be promoted; and in fine, the states will feel the beneficial effects of such an improvement in every quarter and extremity of their territory.

The article coal, which is found in such profusion in the vicinity of the North Branch of Potomac, of a quality equal to the best Liverpool coal, in the event of the completion of the canal, may be afforded in Georgetown, at 20 cents, making full allowance for freight and tolls, at the samea rates s paid by grain, and more valuable articles; and if on such cheap bulky articles, of the first necessity, the freight and tolls are rateably lowered, as would be politic and reasonable, it may be furnished at 16 cents or less. The price may be thus ascertained: supposing a ton or 2,240 lbs. to pay one cent freight, and one cent toll per mile, and where the pits are eight or ten miles removed from navigation, as is the case of those near Cumberland, and the coal have to be carried that distance to the canal in wagons, the price will be,

For wagoning 1 bushel 10 miles	6 cents.
Price and digging 1 bushel	2
Freight for 190 miles	6
Tolls for same distance	6
	20

But, supposing the tolls and freight on articles of this kind reduced one-third as may well be done, with a view to extend the market, the price might be stated at 16 cents.

The price of coal has varied of late in the sea ports, from 25 to 37½ cents per bushel. In Europe, the existence of abundant coal mines is supposed alone sufficient inducement for cutting a canal, so many are the uses, and so immense is the consumption of this article, when it can be obtained on moderate terms. Fuel enters so largely into the price of every article manufactured, that on its cheapness depends, in a measure, the success of numerous establishments, which, at first view, seem to have no connection with it; and in all articles wrought by fire and steam, it is the principal ingredient of price in our country; even the production of agriculture will be increased by a reduction in the

price of coal; the whole of the wood reserved for fuel, in the rich valleys along the Potomac and its branches, would be cleared, and the land brought into cultivation; nor would the beneficial effect here end, but would be felt throughout the borders of the Chesapeake.

Slate banks, of excellent quality for roofing, are found in still greater abundance than coal, and more of them immediately on the banks of the river; so that, if facilities for transportation were carried to the quaries, which might be opened, slate for roofing could, it is believed, be furnished as cheap as the best shingles.

The immense banks of iron ore, which are yet unopened along the river, on account of the limited demand, would, if iron could be transported more cheaply, and the price of fuel was considerably reduced, be another resource added to the wealth of the states, and afford considerable tonnage to the canal; the lime which is now furnished in our seaports and which principally supplies the demand for this most useful article in architecture and agriculture, is brought from Rhode-Island; this would afford a new source of industry and profit to our citizens, now engrossed by our more active neighbours.

Such will be the creation of new sources of wealth and population, and such are some of the prominent benefits to be derived from this canal; within the last 60 years, England has quadrupled her wealth and political importance; and this rise in her fortunes dates with the operation of her canals commenced within that period; Holland, the Netherlands, the Valley of Lombardy, and China, are yet more striking instances of the immense increase of the power and population of territories, in consequence chiefly of canals. When we look at the advantages of the now contemplated canal, its immediate operation on the value of the lands of the South Branch, and Shenandoah, and the whole valley of Potomac, cannot fail to strike the intelligent observer; the mountainous counties of Hampshire and Allegany will, in consequence of the value and abundance of their minerals, become the most important counties in either state, and the points on which the lever will rest that is to advance and extend the manufactures, commerce, and agriculture of the most distant ramifications of the Chesapeake. Cumberland will become the entrepot of the merchandise commerce of the west, and at no distant date a thoroughfare for the greatest commerce of the union. Baltimore being already established, and possessing enterprize and capital, will have it in her power for many years, if not forever, to enjoy the larger share of these new created fountains of wealth; nothing will be wanting to ensure this, but to add a short link to this great internal trade by a canal from Bladensburgh, or the head of the Eastern Branch of Potomac, to the Patapsco at Elkridge; the distance between these two points, in a straight line, cannot exceed 18 miles, and the route of a canal would not probably be more than 25 miles; the elevation on this route above the tide is not great, and the upper part of the Patapsco, and other important streams might, there is reason to believe, furnish the supply of water required for the light level; if this is the case, and there is little doubt of it, the cost of this work would not be great. Or if it should accord more with the wishes and interests of the Baltimori-

ans, to branch the canal at a higher point on the Potomac, let provision be made for trying the practicability of a branch from the foot of the Catoctin mountain, or any point below it to Baltimore.

PROBABLE PROFITS OF THIS CANAL.

Taking the average tonnage of the boats, which have passed through the locks, in the years 1819, 1820, and 1821, from the official document furnished by the Potomac Company, it is 11,815 tons each year; supposing ten barrels of flour equal to a ton, and computing the whole produce in flour, the amount which has descended the river each year, is a quantity of produce equal to 118,000 barrels of flour.

If such is the quantity transported on the river, in its present imperfect state of navigation, it is not extravagant to suppose that four barrels of flour are now carried by land for one which is transported by water, and which, when the canal is completed, will seek that cheaper conveyance. This would make an additional amount of four hundred and seventy-two thousand barrels. The inhabitants of the counties of Hardy, Pendleton, and a large part of Hampshire, in Virginia, and of a considerable portion of Allegany, in Maryland, and of Bedford, in Pennsylvania, are exclusively devoted to grazing; if the facilities of transportation were afforded them by a canal, they would either slaughter their cattle at home, and send down the beef, and pork, or would turn their attention to the more profitable pursuits of agriculture. From these counties, we may then fairly calculate upon the addition of two hundred thousand barrels. The establishment of a canal, will, without doubt, draw commerce from the counties of Franklin, in Pennsylvania, and Shenandoah, Rockingham, and a large part of Augusta, in Virginia, for which, we may confidently add two hundred and fifty thousand barrels. From respectable authority, we learn, that, in the year 1821, 400,000 barrels of flour were made in the four southwestern counties of Pennsylvania, all of which would seek a market by way of the national road and contemplated canal; add to this 160,000 barrels from the state of Ohio, and the counties of Ohio, Brooke, Preston, Harrison, &c. in Virginia, and the aggregate amount is 1,600,000 barrels; the toll, as now established on the Potomac, is 22 cents per barrel for the longer distance, and 11 cents for the shortest; the medium may then be stated at 15 cents; the tolls then upon 1.000,000, would amount to the sum of 240,000 dollars; the estimated cost of the canal is 1,578,954 dollars; upon which the sum of 240,000 dollars, gives 15 per cent. per annum profit, and an excess sufficient for annual expenses.

In this calculation, the tools on the ascending commerce, consisting of plaster of paris, salt, fish in barrels, and foreign merchandise, required for the interior, is not enumerated. They, it is supposed, will amount to a third of the sum of the descending toll. Nor is any allowance made for the tolls on the new articles which will be added to the descending trade, viz.: coal, lime, lumber, Indian corn, &c. So that if any doubt can exist concerning the increase of tolls, in the proportions above stated, this additional source of tonnage will insure the profit of fifteen per cent.

per annum; but there is yet stronger assurance of gaining, at least, this amount of profit, when it is considered how much this rate of toll assured may be increased, and still leave the freight considerably cheaper than it now is, as is so clearly apparent from Mr. Fulton's statement, already cited.

WAYS AND MEANS.

From Cumberland to tide water is 185 miles; the cost of a canal for 182 miles of that distance, is ascertained to be $1,578,954; for the remaining three miles, the canal at the *Little Falls*, when enlarged, may be used; this sum, divided between the two states, will give $789,477, to be furnished by each; it is proposed, that the money should be raised by a loan for 16 or 20 years, which could probably be effected at 4 per cent. per annum; but for the greater certainty, let it be calculated at 6 per cent.; as soon as the loan shall be determined upon, let books be opened, under the direction of the states, for the subscription of stock, by individuals, at such places as the legislatures shall deem expedient, each individual to be entitled to the stock he subscribes for, upon condition of his paying annually to the state the interest on the amount, until the annual profits of the canal shall be adequate to an extinguishment of a part of the loan, and a discharge of the annual interest;* of whatever portion of the stock that shall not be subscribed for by individuals, the states themselves shall be considered as holders; the probable nett profits of the canal, when completed, upon a moderate and sober calculation, have already been estimated at 15 per cent. upon the whole capital required to construct it; whenever the canal shall be finished, let these profits be exclusively appropriated to the payment of the interest and redemption of the loan; and even should these profits yield only ten, instead of fifteen per cent. they would be amply sufficient to liquidate the whole debt in less than 16 years; so that, in order to accomplish this important object, each state would only have to pay for five years, within which time, it is supposed the canal might be finished, the interest on 789,000 dollars, or on so much thereof as shall remain after deducting the amount of individual subscription; but should it be deemed by the legislatures inexpedient to raise so large a sum by loan, it is submitted to their wisdom, in order to test the accuracy of the above scheme, whether it would not be an object of great public utility, to make those sections of the canal between Harper's Ferry and tide water; and whether it would be a measure forbidden by the suggestions of the strictest prudence, to borrow a sum sufficient for their completion; the amount required would be 560,127 dollars; but, take this sum and divide it between the states; let the foregoing plan be adopted, and then the payment of the interest for two years, within which period the canal could certainly be effected, on 280,063 dollars, or so much of that sum

* So that a subscriber, say for one hundred dollars, would, in the event of the completion of the canal within five years, as calculated, and of its yielding a per centum sufficient to discharge the interest and principal on 1,500,000 dollars, in sixteen years, have to advance, in all, only 30 dollars, and then would be entitled to hold 100 dollars in stock; and, in any event, the subscriber could never be called on for more than six dollars per annum.

as should not be taken by individual subscription, would be the only burthen to the states, or, in fact, only half the interest for the first year, as it would be only necessary to borrow money according to the annual expenditure.

It is probable that local jealousies, which are so natural to the mass of mankind, and which have, since the first dawn of civilization, been found in array and opposition to all the internal improvements of nations, and to canals, the greatest of all others, will, on this occasion, have to be combatted; these arise from the supposed effect canals have to injure existing markets, by increasing rivals, and of lessening the value of the productions of those portions of territory already enjoying the exclusive benefit of those markets; these jealousies, however, have, in every country where canals have been introduced, been proved, by experience, to be ill founded; for so great is the dependance of each part on the condition of the rest, and so intimate is the general connection in a nation, that even the favored few, so far from being injured, have been benefitted by the general prosperity; population, commerce, and consumption, have invariably kept pace with increase of productions; and the uniform consequence has been a general increase of power, wealth, and civilization.

MOSES T. HUNTER,
WM. T. T. MASON,
WM. NAYLOR,
ATHANS. FENWICK,
ELIE WILLIAMS.

EXPENSE OF THE PROPOSED CANAL.

The first section commences at Cumberland, in Maryland, and, crossing the river three times, terminates at the mouth of Capon, on its western bank.

The first, crossing to the Virginia shore, just above Cressap's landing, 16 miles from Cumberland, is by a dam of suitable elevation; then, descending by locks into the still-water above the dam, we pass through a guard lock into a canal on the opposite shore.

The second, crossing to the Maryland shore, is also by means of a dam placed just below the mouth of South Branch, 19 miles from Cumberland, to raise the water in the Potomac eight feet. In every case where a dam is the means of crossing a river, a guard-lock is indispensable at the entrance of the canal on the opposite shore. Aqueducts, however, as the mode of crossing rivers, with a canal, are, on account of the superior safety and convenience which they afford to navigation, decidedly preferable to dams, although more expensive in construction; yet, where we cannot avail ourselves of sufficient feeders from side streams to keep always a full and certain supply of water in our upper levels, dams are adopted, because, by them, we obtain from the river an abundant supply. This is precisely the case in the first crossing; and, in the second, there is not sufficient elevation for an aqueduct.

The third, crossing to the Virginia shore, 29 miles from Cumberland, is by an aqueduct; which, by maintaining a level sufficiently high to be safe from freshets in the river, will augment the expense of a piece of walling just about $ 3,900.

SUMMARY OF THE ESTIMATES OF EXPENSE.

For excavating, walling, aqueducts, dams, &c. including six culverts, noted by the engineer	262,656
The extra expense of a wall, mentioned above	3,900
For lockage, 146 feet, (in 18 locks) at 650 dollars per foot	94,900
For 48 culverts, (in addition to those in the first item) at 200 dollars each	9,600
For thirty farm bridges, at 300 dollars each	9,000
For four road bridges, at 500 dollars each	2,000
	382,056
Add for contingencies, engineers, superintendence, &c. 10 per cent.	38,206
Amount of estimates for the upper sect. from Cumberland to the mouth of Capon, 54½ miles, 7 711 dollars per mile, (which, in the same proportion, for a canal of the dimensions of those in New York, forty feet wide and four feet deep, would be 13,983 dollars per mile)	$ 420,262

THE SECOND SECTION

Commences with an aqueduct across Capon, and, continuing on the Virginia side, fourteen miles, crosses the Potomac on an aqueduct to the Maryland shore, and terminates at the western bank of the Great Conococheague.

SUMMARY OF ESTIMATES OF EXPENSE.

For excavation, walling, aqueducts, dams, &c.	184,413
For lockage, 72 feet, (in 10 locks,) at $ 650 per foot	46,800
For 33 culverts, at $ 200	6,600
For 20 farm bridges, at $ 300	6,000
For 3 road bridges, at $ 500	1,500
	245,313
Add for contingencies, engineers, superintendents, &c. 10 per cent.	24,531
Amount of estimates for the second section, 33½ miles, $ 8,055 per mile, (stated in proportion to their dimensions on the canal of New York, it would be 14,606 dollars per mile)	$ 269,844

THE THIRD SECTION

Commences with an aqueduct across Great Conococheague, and, continuing on the Maryland side, terminates at Harper's Ferry.

SUMMARY OF ESTIMATES OF EXPENSE.

For excavation, walling, aqueducts, dams, &c.	228,313
For lockage, 80 feet 8 inches, (in 10 locks) at 560 dollars per foot	52,442
For 33 culverts, at 200 dollars	6,600
For 30 farm bridges, at 300 dollars	9,000
For 5 road bridges, at 500 dollars	2,500
	$ 298,855

Add for contingencies, engineers, superintendents, &c. 10 per cent.	29,885
Amount of estimates for the third section, 38¾ miles, 8,483 dollars per mile; (rated on the canals of New York, in proportion to their dimensions, it would be 15,583 dollars per mile) - - - - - -	$ 328,740

THE FOURTH SECTION

Commences at Harper's Ferry; and, continuing on the Maryland side, terminates at the head of the Great Falls.

SUMMARY OF THE ESTIMATES OF EXPENSE

For excavation, walling, aqueducts, &c. - - - - - - -	229,679
For lockage, 86 feet, (in 11 locks,) at 650 dollars per foot - - -	55,900
For 73 culverts, at 200 dollars - - - - - - - - -	14,600
For 37 farm bridges, at 300 dollars - - - - - - - -	11,100
For 8 road bridges, at 500 dollars - - - - - - - - -	4,000
	315,279
Add for contingencies, engineers, superintendents, &c. 10 per cent. -	31,528
Amount of estimates for the fourth section, 46¼ miles, 7,499 per mile; (rated on the canals of New York, in proportion to their dimensions, it would be 13,598 per mile) - - - - - - - - -	$ 346,807

THE FIFTH SECTION

Commences at the head of the Great Falls, and, continuing on the Maryland side, terminates at the head of tide water navigation in the district of Columbia.

SUMMARY OF THE ESTIMATE OF EXPENSE.

For excavation, walling, aqueducts, dams, &c. - - - - - -	103,527
For lockage, 40 feet, (in 5 locks,) at 1000 dollars per foot - -	40,000
For lockage, 62 do. (in 9 do) at 750 dollars - - - - - - -	46,500
For 12 culverts, at 200, - - - - - - - - - - - -	2,400
For 5 farm bridges, at 300, - - - - - - - - - - -	1,500
For road bridges, (none)	
	193,927
Add for contingencies, engineers, superintendents, &c. 10 per cent.	19,393
Amount of estimates for the fifth section, nine miles, 23,702 per mile, (rated on the canals of New York, in proportion to their dimensions. it would be 42,973 per mile,) - - - - - - - - - -	$ 213,320

GENERAL SUMMARY.

For 182 miles of canal, comprising, besides excavation, walling, aqueducts, and dams, 487 feet of lockage, 205 culverts, 122 farm bridges, and 20 road bridges:

For the 1st section,	54½	miles,	7,711	dollars per mile,		420,262
2d do.	33½	do.	8,055	do.	do.	269,844
3d do.	38¾	do.	8,483	do.	do.	328,721
4th do.	46¼	do.	7,499	do.	do.	346,807
5th do.	9	do.	23,702	do.	do.	213,320
	182	miles,	$ 8,676	per mile,		$1,578,954

This average rate, on the whole canal, $8,676 per mile, would, if applied in exact proportion to a canal of the same dimensions as those in the state of New York, be $15,732 per mile, and this accords with the actual cost of such parts of the New York canals, as resemble ours, in amount of lockage, and in laborious excavation.

All which is respectfully submitted.

ISAAC BRIGGS.

CHESAPEAKE AND DELAWARE CANAL.

THE canal intended to connect the Chesapeake and Delaware Bays, was projected more than twenty years ago, and a company incorporated by the states of Maryland, Delaware and Pennsylvania, to effect this important communication between two of the largest streams that flow through the Atlantic states. The work was commenced, but languished for want of funds, and was totally suspended, like other great public undertakings, by the occurrence of the late war and the embarrassments since experienced by the nation. In 1809 the president and directors of the Chesapeake and Delaware Canal Company, petitioned the Congress of the United States to grant them aid to complete this work. They say in their petition, "Your memorialists beg leave to remind Congress, that each of the states possess so many local or domestic objects for the application of their respective resources in opening their rivers and roads to internal communication among themselves, that it seems with propriety they look to Congress for the promotion of those works of the same kind, whose advantages are of general importance to the union, and justly designate them as great *national objects,* claiming the protection of the general government.

"Such is the opening of the Chesapeake and Delaware Canal; for if the important isthmus between those waters, and another between Trenton and the Rariton in New Jersey, which is also contemplated, be reduced to practicable navigation, an easy and direct communication will be established from the southern limits of the Chesapeake to New York, and from thence by the river Hudson to Albany on the one hand, and by the Sound to the New England states on the other; which communication may be extended both to the southward and northward so as to form a direct and easy internal navigation from the lakes of Canada through the whole eastern boundary of the United States.

"It is a fact well known, that during the late revolutionary war, no circumstance was so injurious to our defence, or so much assisted our enemies, as the difficult and tedious communication between the eastern and southern states, since the advantage possessed by the enemy at sea to block up our ports, to conquer our maratime towns, to invade us in numerous positions at once, and to convey their armies along our coast, with a celerity which no means could guard against, or army defend, formed almost every difficulty, and the source of every danger we experienced.

"But if the communication in question be established, not only would internal commerce be completely retained, and foreign supplies landed in one state be quickly diffused through the rest; but by securing the mouths of a few rivers, our cities would be protected and our armies in every position conveyed wherever necessity should call them, and a cheap and easy defence established through the union."

This important work which has been so long obstructed in its progress, seems now in a fair way of being rapidly accomplished. The citizens of Philadelphia have become aware of the vital interest they have in this canal, and within about 12 days $150,000 have been subscribed there towards this great object; we have no doubt that much more will be subscribed, and the spirit of enterprise which now distinguishes the people of Philadelphia will be amply rewarded, by an immense increase of trade with the interior through the Chesapeake Bay and the Susquehanna river. Besides this, a great national object will be effected, and the transit of goods, travellers, and even armies, if such a thing should unhappily be hereafter necessary, will be rendered easy and expeditious from New Jersey to Virginia, a distance of more than 400 miles, thrown open by a canal only 22 miles long. We hope, ere many numbers of this work are before the public, to report a signal progress in this noble undertaking.

Since the above article was written, the following has appeared in the public prints on this subject.

"We learn from the Philadelphia Freeman's Journal that the town of Wilmington, Del. subscribed on Monday upwards of $30,000 to the stock of the Chesapeake and Delaware Canal. A paragraph in the Democratic Press, of Tuesday afternoon, says—"*We believe the whole of the stock required for the* CHESAPEAKE AND DELAWARE CANAL *is subscribed.*" There is, we presume, no doubt of this result. We have been convinced for a long time past that the canal would be made at some period, sooner or later; and we see in the late energetic course of the people of Philadelphia, that *the period has now arrived.* The trade of the Susquehanna river is an object well worth contending for. Taking its rise in the heart of New York, it flows through the most fertile lands of that state, traverses the whole extent of Pennsylvania from north to south, and after receiving the numerous tributary streams which water a vast additional extent of territory, finally discharges itself at the head of the Chesapeake Bay. The waters of this noble river are as yet the principal channel by which the various products of a fertile, extensive, and growing country, are brought to market—and that market is Baltimore."—*Balt. Amer.*

ENCOURAGEMENT OF MANUFACTURES.

IT is a curious circumstance and demands the serious consideration of some persons, that at the very time when the late Congress were discussing the merits of the proposed alteration of the tariff in favour of

domestic manufactures, and the members in opposition to it were urging its impolicy, injustice, and ruinous tendency on the best interests of this country; our British rivals who were the only persons likely to suffer disadvantage from the new arrangement of the duties, magnanimously acknowledged the patriotism and wisdom of the proposed measure. And, surely, however unwilling Americans may be (and justly so) to follow the maxims of Europeans on some subjects; it must be allowed that they are very good authorities in matters relating to the nature, and tendency of manufactures, in their operation on national wealth. The following extract is from a journal published at Glasgow, Scotland, and appears to have been written on the supposition that the new tariff had passed into a law, an opinion prematurely formed, alas!

GLASGOW, February 20th.

"The reader will observe from the extracts from the new American tariff, inserted above, that a considerable advance is proposed in the duty of most sorts of woollen, linen and cotton goods imported. The object of this is less revenue than encouragement to the domestic manufactures. How much soever this is to be regretted for the sake of our own trade, it is impossible to blame the Americans; who, when they cannot find a market for the agricultural produce of the southern states, must either manufacture for themselves or cease to make progress in prosperity and wealth."

In addition to the foregoing paragraph, and on the same subject, we subjoin the conclusion of the Memorial of the Board of Manufactures of the Pennsylvania Society for the encouragement of American manufactures, presented to the last Congress. Verbosity and tedious argumentation are useless and unnecessary here. To the impartial and dispassionate these short documents speak volumes.

"We have probably exported this year 135,000,000 lbs. of upland cotton. At 8 pence sterling per lb. which is the average of the year in Liverpool, it amounted to £4,500,000 or about $20,000,000. Had we manufactured 35,000,000 lbs. additional, and the increase in value by the manufacturer been but four fold,* it would amount to about $20,000,000, the actual amount of the whole crop, leaving a national gain of about $15,000,000 for rent, wear and tear of materials, wages of labor, and profit of capital. And from the luminous circular letter of Cropper, Benson & Co. recently published, and the actual state of the production of cotton in all the countries where it is cultivated, as well as the great increase of consumption, there is no doubt that the residue would have produced as much as the whole has done. The price abroad has fallen by exceess of exportation.† Nothing but a decrease is likely to

* Very recent accounts from Great Britain warrant the belief that the increase is 7 or 8 fold. The exports of cotton goods from Great Britain this year are about 23,000,000*l* or above 100,000,000 dollars.

† The average price in Liverpool in 1819 was 15¾ pence sterling. That year there were only 200,000 bales imported from this country. The next year the importation was 300,000 bales, and the price fell to 13d. In 1821, the importation continued at 300,000 bales, and the price fell to 11d. This year the quantity increased conside-

raise it; and nothing but extending the domestic consumption can produce this decrease. The interests, therefore, of the cotton planter and cotton manufacturer are indissolubly identified; and the general prosperity, wealth, power, and resources of the nation materially depend on the regulation of our policy with a steady eye to this identity. Cropper, Benson & Co. expressly state, that by a decrease of the exportation, our planters '*might sell their cotton at any price.*' What an important field for reflection on the immense advantages presented to us by bounteous nature, which we lavish for the support of foreign industry and foreign governments! These considerations might be advantageously extended to various other branches of our industry.

"We could make large additions to this memorial, but we hope we have adduced sufficient reasons to prove, as we stated, that the tariff is unjust, oppressive, partial, and impolitic, and requires complete correction.

"All which is respectfully submitted.

"Signed by order of the board,

"WILLIAM TILGHMAN,

"*President Pennsylvania Society for encouragement of American Manufactures.*

"Attest,

"HENRY HORN, *Sec. pro. tem.*

"*Philadelphia, Dec. 30th,* 1822."

ON STEAM-BOATS.

Extract from the Report of the Select Committee of the House of Commons, appointed to inquire into the state of the roads from London to Holyhead, &c. and into the regulations for conveying his majesty's mail between London and Dublin, &c. &c.

Ordered to be printed, 12th June, 1822.

YOUR Committee, since they presented to the House their second report, have prosecuted the inquiry, then only just begun, into the important subject of steam-boats. * * * * *

It appears from the report of the Select Committee of the session of 1817 on this subject, that there were then 17 large steam-boats in constant employment on the American rivers, besides ferry-boats; a list of steam-boats has been published by Mr. Robinson, that shows that on the Mississippi alone the tonnage of those in work at present amounts to 7,259 tons, and of those building to 5,995 tons. There are now, in all, about 300 steam-boats in use in America.

Mr. Bell continued to turn his talents to the improving of steam apparatus, and its application in various manufactures about Glasgow, (Scotland); and in 1811 constructed the Comet steam-boat, of twenty-five

rably, and the price has fallen to an average of 8d. These are facts which cannot be too seriously considered by our statesmen.

tons, with an engine of four horse power, to navigate the Clyde between Glasgow and the Helensburgh Baths, established by him on an extensive scale. The success of this experiment led to the constructing of several steam-boats, by other persons, of larger dimensions, and with greater steaming power; these having superseded Mr. Bell's small boat in the Clyde, it was enlarged, and established as a regular packet between Glasgow and the western end of the Caledonian canal at Fort William, by way of the Crinan canal in Argyleshire. Mr. Bell about the same time constructed the Stirling Castle steam-boat, and employed her on the river Forth, between Leith and Stirling; he afterwards took her to Inverness, where she has been for two years plying between that town and Fort Augustus, going seven miles by the Caledonian canal, and 23 miles along Loch Ness. Many other boats were successfully established about this time on the Forth and Clyde, and several on the rivers Tay, Thames, Mersey, and Humber, and between Southampton and the Isle of Wight; but it was not till the year 1818, that a steam-boat was made use of to perform regular voyages at sea. In this year the Rob Roy of ninety tons, built by Mr. Denny, of Dumbarton, and with an engine of thirty horse power, made by Mr. Napier, of Glasgow, plied regularly between Greenock and Belfast, and proved the practicability of extending the use of the steam engine to sea navigation. In the year 1819 the Talbot, of one hundred and fifty tons, built by Messrs. Wood, with two thirty horse engines made by Mr. Napier, plied daily between Holyhead and Dublin, and throughout the whole summer and autumn, and successfully encountered many severe gales. In the year 1820, the Ivanhoe, of one hundred and seventy tons, built by Mr. J. Scott, with two thirty-horse engines made by Mr. Napier, was established on the same station; and in 1821 the postmasters general introduced steam-boats at Holyhead and Dover for the conveyance of the mails. During these three last years, the Belfast, Robert Bruce, Waterloo, Eclipse, Superb, Majestic, and Cambria were constructed, of large tonnage, and with engines of great power, for conveying passengers between Greenock and Belfast and Liverpool; between Liverpool and Dublin, and between Liverpool and Bagilt in Flintshire. All these vessels, except the Cambria and Belfast, were constructed in the Clyde. In the year 1821 the City of Edinburgh and Mountaineer were established to go between London and Leith; and, in the present year, there have already been fitted for sea the St. Patrick and St. George at Liverpool; the James Watt, for the Leith and London station; the Swift, to go between Brighton and Dieppe; the Sovereign and Union, between Dover and Calais; and the Lord Melville, to go regularly between London-bridge and Calais; twelve more are in hand, and will be completed this summer. Ferry-boats propelled by steam, sufficiently commodious to carry carriages, horses, and cattle, have been established with great public utility on the Tay between Dundee and Fifeshire; at the Queen's Ferry in Scotland; on the Severn, the Mersey, and the Humber, and at other ferries.

The experience of what steam-boats have performed, is fully sufficient to place beyond all doubt their safety even in the most tempestuous

weather. The Rob Roy plied two winters between Greenock and Belfast, and last winter between Dover and Calais; the Eclipse plied the whole of last winter between Glasgow and Belfast, and the Cambria between Liverpool and Bagilt; a steam-boat has plied regularly, through all seasons, between New-York, the Havannah, and New Orleans; all the other steam-boats which have been used at sea, have been exposed to numerous severe gales. But the trial which the Holyhead steam-boats went through during the last tempestuous winter, from the nature of the service requiring them to go to sea at a fixed hour every day, proves that steam-boats, when properly constructed, are able to go to sea when sailing vessels could not, and that in some respects they possess, in very bad weather, advantages over sailing vessels.

The following extracts from the evidence of Captain Rogers is quite conclusive, as to the power and safety of steam-boats at sea.

"Q. Have you had full trial of the steam-packets, with respect to gales of winds?—A. Yes, in every way. I crossed in the Meteor, on the 5th of February, in the heaviest sea I have seen during eight years I have been on the station.—Q. Have the steam-packets sailed regularly during the whole winter?—A. Except a very few days; I have seen them go several times when sailing-packets could not.—Q. Have you found that the steam-packets built under the inspection of the Navy board are as safe as any vessel you ever navigated?—A. Certainly.—Q. Is there danger, in your opinion, to be apprehended from them as steam vessels?—A. No.—Q. Are you of opinion, that in the event of the engine failing, with the assistance of sails and the anchor you may keep a packet in perfect safety?—A. There is no doubt of it; by putting two cables together, which she has on board, she would ride out any gale in the channel as easy as a glove.—Q. Are the committee to understand your opinion to be, that in any weather, however severe, the steam-boats will stand that weather as well as any sail-boat?—A. Yes, in any wind; the more wind the better for the steam-boats; that is where they show their superiorty.—Q. In the heaviest gale that could blow, you would rather be in a steam-packet than a sailing-packet?—A. Yes; that is, in a vessel of our construction.—Q. Have you found, in blowing weather, that the vessel works at all, either inside or out?—A. No, not at all; I do not see it in the least, not a single thing, she is as solid as a wall.—Q. Was the last winter a worse winter than usual?—A. I have heard it said that it has been the worst winter for fifty years; Loyd's have paid more this winter than ever they did.—Q. Can you carry one boat on each quarter?—A. We can carry two, but all that is lumber; we never think of being drowned or burnt now." In another place Captain Rogers says, "I never read a novel before I was on board a steam packet, and I go down now frequently, and read for an hour or two."

The following extracts from the answers of the other Holyhead captains, corroborate the evidence of captain Rogers. Captain Goddard says, "These vessels, by their performances through the past winter, have exceeded the most sanguine expectations; and certainly have made passages across the channel when the sailing packets would have found extreme difficulty to have accomplished them; and in so short a period

of time as places their performance beyond the necessity of comparison to establish their great superiority." Captain Skinner says, "I am of opinion, a steam packet of about one hundred and eighty tons burthen, form similar to that of the Meteor, with a little finer entrance and strength of building, with masts and sails the same, would be the best; a vessel of that description would be able to make a voyage, when it was fit weather for any other vessel to put to sea." Captain Davies says, "the two vessels on this station have answered wonderfully well."

The testimony of the Holyhead commanders is not only extremely important, in consequence of the experience they have had of the performance of the steam packets during the last winter, but also because it is to be recollected, that even after the Talbot and Ivanhoe had been on the station, it was their opinion that no vessel could perform the winter service with safety but sailing cutters, such as the old Holyhead packets. This opinion it was natural they should entertain, knowing so well as they did, the heavy seas and desperate gales which frequently prevail for weeks together in the Irish channel. But the trial of last winter having now brought them to acknowledge a change of opinion, this circumstance does every thing that by possibility could be wanting to establish, upon the best authority, the safety and superiority of steam-boats for this service.

Notwithstanding the great number of steam-boats which have been constantly in use, in different parts of the kingdom, during the last ten years, very few accidents have occured, and these few are chiefly owing to the novelty of the experiment: so many precautions are now taken, that there is no reason to apprehend the recurrence of any serious accidents. The general use of low pressure boilers made of wrought-iron or copper has removed the possibility of accidents from their bursting. If one of these boilers give way, the materials do not fly, but are rent asunder. This part of the subject was very fully investigated by the select committee on steam navigation, in 1817; and the evidence given before that committee contains every thing that is necessary to remove all apprehensions of danger from the bursting of low pressure boilers. In respect to the furnaces, they are so constructed that there is no danger from fire, because there is water all round them. Mr. James Brown says, "I hardly think it possible that fire can take place, because the furnaces are completely surrounded with five inches of water round every part." The coals are kept in iron cases, so as to prevent all communication with the fires; and if, in addition to these precautions, vessels are supplied with extinguishing fire-engines, there is no danger of accidents from fire. It has been suggested, that steam vessels are not provided with a sufficient number of boats, and that an act of Parliament should be passed to require every vessel to carry a certain number according to her tonnage; but your committee, after the fullest consideration, are strongly of opinion that the policy of avoiding to do any thing that could by possibility check the spirit of improvement which now is so prevalent, and which promises such great advantages to the public, is that which ought to be followed. It is to be remembered, that the expense of fitting out steam-vessels is very heavy, and that

proper experiments of new inventions cannot be made but with the risk of incurring considerable loss; and as nothing would check the zeal of those who are disposed to make such experiments so certainly as meddling of officers exercising the powers of a regulating act of Parliament, nothing could be more baneful than the interference of the legislature with this new branch of science. The Ballast Office of Dublin brought a bill before the House of Commons last year, for the purpose of appointing inspectors over the Liverpool and Dublin packets; but the chief secretary of Ireland, Mr. Grant, very judiciously put a stop to its progress. Individual security in steam-boats will always be sufficiently provided for, by the interest of the proprietors constantly contributing to lead them to do all those things which will best obtain the custom of the public. Competition in this case, as in all others, will more effectually establish those precautions which are right to be taken, than the best devised regulations of an act of Parliament. But at the same time that your committee decline to recommend any legislative controul, they are decidedly of opinion that the owners of steam-vessels who omit to provide a sufficient number of boats, to secure the safety of their passengers, in case of any sudden accident, are guilty of great neglect, and not deserving of the countenance and support of the public. Besides this precaution, in respect to boats, there ought to be on board every steam-boat, for the perusal of the passengers, a certificate of some experienced engineer, to testify the strength of the boilers; the sufficiency of the valves; the safety of the furnaces, and the general good condition of the vessel and machinery.

The speed and regularity with which steam-boats perform their voyages, is the next point worthy of being brought under the notice of the House.

The average length of the voyages of the Holyhead packets, from the 1st of June, 1821, to the 1st of June, 1822, has been about seven hours and a half; the average of the sailing packets was fifteen hours. Captain Percy, who commands the Hero, London and Margate packet, says, "We generally make the passage in seven hours and a half, the distance being eighty-four miles." Mr. James Brown says, "The Edinburgh Castle has gone from London to Leith in fifty-eight hours, a distance of four hundred and fifty miles; but that the James Watt is a faster vessel, her speed being ten miles an hour through still water, independent of wind and tide." Mr. Traill states, that the Majestic has performed the voyage from Grenock to Liverpool, a distance of two hundred and forty miles, in twenty-two hours; and that the Saint Patrick came from Dublin to Liverpool, one hundred and thirty miles, in thirteen hours and a half, against a stiff breeze from the east. The Lord Melville goes from London-bridge to Calais in eleven or twelve hours. This great speed with which the voyages are made by steam-boats, adds considerably to their superiority over other vessels in point of safety; for in the same degree that the time occupied in performing a voyage is diminished, so is the risk of danger also to which passengers are exposed.

It is now evident that the failure of all the early attempts to apply steam to sea-boats, was owing to their being built too square; to their want of strength, and to the want of a sufficient quantity of steaming power. According as boats have been built with a form planned on better sailing principles, with greater strength of timber, and with engines of increased power; the progress of their success has exactly corresponded with these improvements.

On referring to the list of steam-boats, accompanying the report, (which will be found in the Philosophical Magazine, of October, 1822, and in the index to the Repertory of Arts of the same year,) it will be seen that the Talbot, and Ivanhoe on the Holyhead station, and the Belfast, Eclipse, Superb, and Majestic, on the Greenock and Liverpool passage, will be found to be the first strong and powerful boats which were built, and they were the first that completely succeeded. The strength and power of the Holyhead packets are clearly the cause of their success; and the still greater power which has been given to each of the new boats, the St. Patrick and St. George, lately built at Liverpool, namely, of two fifty-five horse engines, promises to make them superior to any of their predecessors.

Your committee, having thus briefly given a general description of the rise and progress of steam navigation, will now proceed to make such observations, as the information they have obtained seems to justify, upon the more scientific part of the subject; and in doing this, they will divide it under four heads;—1st, the form of the vessel;—2d, her strength;—3d, the machinery;—4th, sails.

I. FORM OF VESSEL.

Captain Rogers says, "In building a steam-boat she ought to have a fine entrance, and her bow to flear off, not to shove any water before her; she should have a good line of bearing, and her transom pretty square, and not too high; the transom being square and low, and fine under, so as to give her a right line of bearing, will stop her pitching and rolling, and make her easy on the sea, and add to her speed." Captain Townley, who has been commanding steam-boats, since 1819, between Dublin and Liverpool, says, "As to form, a steam-vessel should have an extreme fine entrance below, rise well forward, and flam off, so as to let her fall easy into the sea, and throw it off when steaming head to wind; she should have but little rise of floor, so as to be pretty flat under the engines, and run off as clean as possible abaft; I approve of giving them a good deal of rake forward." Captain J. Hamilton, of the Arrow Post-office Dover packet, recommends for wet harbours "a vessel with a rising floor about three inches hollow, to prevent her rolling; fair and easy curved water-lines; the stem to rake well, which makes her easy going head to sea; the stern-post to stand square to the keel, and to draw from seven feet nine inches to eight feet water." Mr. John Scott, shipbuilder at Greenock, says, "I have continued to make the fore body of my vessels very fine, with a good entry, which I have always found made the vessel sail faster and easier impelled." Messrs.

Maudslay and Field say, "The form of a steam-vessel under water should be that of the fastest schooner, bold at the bows, the whole vessel rising but little out of the water; the sponcings, or projecting work on the sides, added to the proper body of the vessel, and rising from the water-line at an angle no where exceeding forty-five degrees from the perpendicular of the side; the bulwarks, wheel-cases, and all the exterior of the vessel, smooth and free from projections that would hold the wind." Messrs. J. and C. Wood, say, "The vessel should be formed with a fine entrance and run; sharp raking bow, both below and above; a broad transom not too high placed; a good rise in the floor, limited by the draught of water, and the occasion of taking the ground."

II. STRENGTH OF THE VESSEL.

The regularity, speed, and safety, with which the Holyhead steam-boats crossed the Irish Channel, throughout the whole of last winter, are the best evidence of the vast importance of great strength in the construction of this description of vessels. Captain Rogers says, that he would rather be in a steam-boat, in the heaviest gale that could blow, than in a sailing-packet, if constructed like the Holyhead steam-boats; and it is evident, from his whole testimony, that the great confidence he places in them is on account of their prodigious strength. He says "Their strength is owing to their being filled up solid to the floor head; to the timbers being put together and diagonally fastened on Sir Robert Seppings' plan; to their being caulked inside and out, having no tree nails, but bolted, and copper fastened; the bolts being driven on a ring clinched at both ends."

Sir Robert Seppings, in his answers to the printed queries of the committee respecting the proper strength of a steam-boat, says, "In point of strength I consider that the principle introduced into the Sovereign and Meteor (Holyhead packets), should be generally adopted in all steam-vessels; and in fact in all other vessels, but particularly in those of the packet class; as it gives safety in the event of the loss of the keel, and also a proportion of the plank of the bottom; either of which would be the destruction of a vessel constructed on the common principle."

Messrs. Maudslay and Field say, "The straining of a vessel at sea has frequently broken some parts of the machinery, but in a vessel well adapted for the open sea, her great strength should be a security against accident from this cause; the vessel should be exceedingly strong." Mr. J. Cook, of Glasgow, recommends that a steam-vessel of one one hundred and eighty tons should be built with a scantling for a sailing vessel of twice that tonnage. Mr. Roger Fisher says, "There has been, in my opinion, a great improvement made in the strength of steam-vessels built here (Liverpool) lately; that is, by carrying the frame timbers up so as to form the projection of the sides, and then regularly planked up solid as any other part of the vessel, by which means they are much safer." Mr. Brunel, when asked whether he would recommend a steam-boat to be built much stronger than usual for sailing ves-

sels? gave the committee to understand, that great weight would be injurious, by lessening the buoyancy of the vessel; but captain Rogers's evidence corroborates the opinions of the other witnesses, and seems to show that this inconvenience does not follow:—Q. Have you found those two vessels (the Holyhead steam-boats) equally buoyant with any other you have sailed in? A. Yes.—Q. Has the great weight of their timbers, and other materials, diminished their speed? A. No; I think it rather gives them speed against a sea.—Q. Then the inconvenience anticipated from the mode of constructing these vessels has not taken place? A. No; it has not." Mr. George Henry Freeling says, "I have attempted to gain some information about every steam-vessel which has been built, and I am convinced these vessels (the Holyhead packets) will do what no other vessels can do, they will go to sea in weather when nothing else can; I attribute that not only to the machinery; but to the great weight of the hull; a lighter vessel in a heavy sea would be checked; but these vessels have from their weight a momentum so great that it carries them on, when a lighter vessel would be checked; the weight acts as a fly-wheel."—I have the authority of Mr. Lang, of the navy board, for stating, that with the exception of the discovery ships, there are no vessels so strong."

III. MACHINERY.

The steam-engine, employed on board ships is as yet a much less perfect machine than when it is used on land; the height of the cylinder is nearly one half less; the power is thereby cramped by short strokes, which are incalculably bad. In this way there is a great loss of power, as the *vis inertiæ* is to be overcome on every stroke; more frequent alternations are necessary of the beam, the piston, and the valves, which occasion more wear, and more friction than where the cylinders are made longer. There is also a considerable loss of power in converting the alternate motion of the piston into the rotary motion of the paddles.

The engines, as now used at sea, want some contrivance to enable them to bear with the irregularity of the pressure on them; sometimes there is a vast excess, sometimes a deficiency, and sometimes a total absence of the resisting medium. "These irregularities throw the ungoverned, and almost irresistible power of the steam-engine, into those convulsive starts that meet no other controlling check but the arm of the crank, from which it recoils with increased energy to the opposite side, occasioning thereby those destructive shocks, those alternate strains and wrenchings, which a frequent recurrence must render fatal to the cranks and to the shafts, besides other parts of the machinery." To remedy these defects by such combinations of machinery, as may enable the engine to adapt and accommodate itself spontaneously to all the exigencies incident to its peculiar service, is one of the chief objects which should attract the attention of engineers.

The great size of the boilers, as now made, is very disadvantageous. They occupy a very inconvenient portion of the space within a vessel.

The method of fixing the paddles is a very defective part of the machinery: the oblique action of them in entering and departing from the

water, produces that tremulous jarring which serves to loosen the seams and the bolting of the knees and beams of the vessel; it also occasions a very great loss of the steaming power.

In respect to the degree of strength proper to be given to the machinery, almost all the engineers, who have been examined, concur in the opinion that it ought to be very considerable. Messrs. Wood say, "all the connecting machinery should be twice the strength for ordinary work on shore." Mr. Donkin says, that every part of the engine should be made at least of three times the strength, which, by estimation, would be required for any force to which it might be exposed. "Accidents," he observes, "are most likely to happen at a time when the suspension of the power of the engine would be most fatal."

Wrought-iron is strongly recommended to be used in place of cast-iron; and though some of the witnesses have expressed doubts of the practicability of making large shafts of wrought-iron, Mr. Donkin does not hesitate to say, that "they can always be got quite perfect, if a sufficient price is given for them"

As so much of the safety of the vessel depends upon the workmanship of the materials, they should be proved before they are used, by a proper proving engine for trying their strength, as well by a force acting in a twisting direction, as by a strain in the direction of their length.

When Mr. James Brown was asked by the committee, "Is an engine liable to that extraordinary pressure upon it, under particular circumstances, that it is better to have some part of it that would give way?" replied, "I should think so." Mr. G. H. Freeling says, "there must be some part of the engine left to give way in case of an emergency, which is better than destroying the cylinder." But Mr. Timothy Bramah, Mr. Donkin, and Mr. Field, say, that the engine should be made so strong, that it may be brought to rest without the fracture of any of its parts, in case it met with a resistance that would require its ultimate power. They mention instances that have come under their own personal observation, of engines having, in this way, stopped with no other effect than that of the steam forcing open the safety valve and going off.

It may be collected from the evidence, that the greater part of the breakages which have occurred of different parts of the machinery in steam-boats, has been owing to the negligence of the engine-keepers; starting the engine without clearing off the water which is formed on the top of the piston, from condensed steam, is one cause of fractures; other accidents have arisen from suffering the bearings upon which the shafts work, and the links connecting the piston with the beam, to get loose; and in some cases from making them so tight, that the bearings heat; and also from not attending carefully to the steam valve when the vessel is exposed to a heavy sea. Mr. Watt says, "with the experience now obtained, we make no doubt but that we shall be able to construct machinery less liable to accident; but much must always depend upon the vigilance and experience of the men who work the engines. Mr. James Brown being asked what were the causes of acccidents to the machinery, replied, "they depended more on the engine-keepers than any thing else."

Mr. Donkin says, "I have reason to believe that some of the steam-boat companies have suffered severely from a want of regular professional inspection;" and being asked, "Do you conceive that the injury to engines from neglect is greater than the injury arising from the actual working of them?" replied, "Yes I do;" and being further asked, "Has that been a constant defect in the management of steam-boats up to this period?" replied, "Yes, I conceive so."

All the evidence is so decidedly in favour of making boilers of copper, that it is necessary only generally to refer to it. Messrs. Fenton and Murray, of Leeds, say, "The boiler ought to be what we call a combined boiler, viz. three distinct boilers put together to form one boiler, with the fire passing three times through each, and so constructed as to be taken up and down a hatchway without pulling up or destroying the decks."

Mr. Donkin and Mr. T. Bramah are of opinion that all boilers are now made too large, and that the same quantity of steaming power might be obtained with a smaller body of water, if the surface of the boiler exposed to the fire was sufficiently large.

All the witnesses agree in opinion as to the necessity of keeping the machinery as low as possible in the vessel: Mr. Watt says, "This will diminish the top weight, make the vessel more steady at sea, improve the action of the machinery, and add to the safety of the vessel. Messrs. Maudslay and Field say, "The best arrangement of the machinery, and in which engineers are most agreed, is to place the boiler or boilers a few feet abaft the centre of buoyancy of the vessel; the two engines on each side a few feet forward of this point; and the coals on the centre of buoyancy: this arrangement brings the fuel, which is constantly variable, on a point that will not affect the trim of the vessel; it also brings the wheel shaft, which is at the foremost end of the engine, to its best position as regards the length of the vessel, viz. at about one-third from the head: the weight of the boiler, engine and coal, is thus spread pretty equally over the space allotted for them, and partial and intense weight on any one part is thus avoided."

Several of the witnesses having mentioned the injurious effects of sea-water upon the boilers, your committee examined Mr. Michael Faraday, who acts as chemical assistant to Mr. Brande at the Royal Institution, concerning the chemical properties of sea-water. Mr. Faraday's evidence explains the temperature and degree of saturation of the water in the boilers at which various salts are deposited, and by what process the metals, of which the boilers are made, are injured. It appears that the greatest care is requisite on the part of the engine-keepers to prevent the water in the boilers from being so much saturated as to occasion the deposition of the salts. When this takes place these salts corrode the metal and destroy a portion of it, and form crusts over the internal surface of the boilers, which having bad conducting powers as regards heat, diminish the quantity of the steam, and cause the fire to burn the boilers and the flues.

Mr. Faraday explains, that the injury done to iron boilers by the

deposition of salts, is much greater than the injury which is done to copper boilers; an additional and very strong reason for using the latter.

Messrs. Maudslay and Field state, that the fire-places and boilers are frequently burned and injured from the incrustations made by deposited salts in the boilers, through neglect to change the water and clean the boilers; and Mr. Donkin says he has known great inconvenience from the same cause. In one instance, going to Margate, one out of three boilers in the vessel produced very little steam, in consequence of the incrustations on the bottom, a circumstance that was discovered by its requiring very little water to be introduced into it. Mr. Donkin further says, that he knows only of two methods by which the deposition of salt can be prevented. "In the Regent steam-boat they employed a method very successfully, that of pumping hot water through the boiler, and allowing a certain quantity constantly to be discharged from it into the sea; by these means the water was always kept in a sufficiently diluted state, so as to prevent its becoming saturated with salt, and consequently none could be deposited. No other inconvenient effect was produced than a greater consumption of fuel. The other mode is the common and ordinary one of taking out the whole of the water when the vessel arrives at the place of destination, and if there is any deposit of salt, take that out also."

In consequence of the injury which sea-water does to iron, Mr. Cook recommends the air-pump, buckets, rods and valves, should be made of copper or brass.

It is necessary that great care should be taken in selecting coals to be used in steam-boats; they ought to burn free and become complete white ashes, without caking on the fire bars. Mr. Brown says, "that in the first passage he went in the City of Edinburgh to Leith they were obliged to clear the fire every four hours; but having got a better description of coals at Leith, called Halbeath Main, they went, in coming back, sixteen hours without clearing the grates." Mr. Donkin says, "I think the coals ought to be particularly attended to; first, the kind of coals; and secondly, to avoid taking small coals so long as the common fire places are used; small coals occasion great waste; and all coals employed for steam-boats ought to be screened." There is another reason why attention should be paid to the selecting and managing of the coals, arising from their tendency to fire spontaneously, if put together in large quantities in a damp state, and then exposed to the heat of a steam-boat.

It will be seen by the evidence, that the consumption of fuel differs very much, according to the various plans on which the engines are constructed, even where the steaming power is the same.

In adapting the quantity of steaming power to vessels, the object, as as yet seems to have been to obtain a great degree of speed in smooth water. But this principle, in respect to sea-vessels, is clearly an erroneous one; for the proper object is not so much having great speed through smooth water, as a certain progress, even at a very moderate rate, against a head sea in a heavy gale of wind.

The quantity of power sufficient to accomplish this is, that quantity which should be applied to every sea-boat, if her size and draught of water will admit of it. Mr. Donkin says, "from the observations I have made in most vessels, I have found them to have too little power for the size of the vessels:" He recommends that the engines should be made considerably larger than necessary for giving the vessel the required velocity in still water: he says, "there is no other disadvantage from increasing the power of an engine than the room it requires and the expense; but to counterbalance these, there is an advantage in not being obliged, at all times, to work the engine up to the extent of its full power; less fuel would be consumed, and the engine would be less likely to go out of order."

Mr. T. Bramah says, "you cannot have too much power; indeed it is always of advantage to have as much power as can be obtained." Messrs. Maudslay and Field say, "with regard to the quantity of power proper to put into a sea-vessel, the only limit should be the weight of the engine and fuel the vessel will carry and contain; no vessel ever had too much power, even in still water, much less when contending against a heavy head wind." "Two engines," they go on to say, "of half the power each, are more manageable, and possess many advantages over one of the whole power; they produce a perfectly uniform rotation in the wheels, and are not subject, like single engines, to be stopped on the centre in heavy seas; and in case of injury to one engine, the other is available."

It appears from Mr. Brown's evidence, that two fifty-horse engines will weigh from twenty to twenty-five tons, more than two forty-horse engines; the weight of the latter, with coal and water complete, being one hundred tons. The additional expense would be about £1,000; the expense of two forty-horse engines being about £6,000. According, therefore, to the opinions already stated, when a vessel will contain two fifty horse engines, it will be decidedly better to have them of this power than two of forty-horse power.

Notwithstanding the great and rapid progress which steam navigation has made, it is still considered, by the ablest engineers to be only in its infancy: experience suggests, in every new vessel and engine, some improvement to be made, or some defects to be removed. The numerous companies that have been formed in so many parts of the united kingdom, have established an extent of competition which necessarily excites all the science of the country to seize on every opportunity of making every thing better than it has been made before; and, as the confidence of the public in steam-boats leads to the general use of them, there is that fair reward for enterprising undertakings which will effectually sustain the general spirit which prevails amongst all the most scientific engineers, seamen, and ship-builders, to invent further improvements.

It appears from the evidence, that attempts are now making, by very ingenious individuals, to remove some of those defects which have been described to belong to the engines now in use.

Mr. Brunel is engaged on a plan for making the engine more compact and more simple, and at the same time stronger; and to enable it, by certain mechanical combinations, to adapt and accommodate itself to all the exigencies, and to all the perturbations incident to its peculiar services.

Mr. Galloway and Mr. Perkins feel confident that high-pressure boilers may be so contrived as to be used with the greatest advantage. Mr. Perkins, in his answers to the circular queries, gives such strong evidence in favour of them, from the actual use of them in 150 American steam-boats, as to go far towards removing the prevailing objections to them.

Mr. Donkin is of opinion, that a rotary furnace, on Mr. Brunton's principle, may be applied to steam-vessels. This would be so very valuable an improvement, that your committee beg the attention of the House to Mr. Donkin's evidence on the subject:—"Q. Are you of opinion that this apparatus may be applied to engines on board ships?—A. Yes, I think with very great advantage; it probably would require a little variation in its construction.—Q. What are the general advantages of this plan? A. The general advantages are economy of fuel and labour, and greater safety to vessels.—Q. In what way do you consider it would contribute to greater safety? A. Because it prevents the continual operation of feeding the fire by hand, which requires the fire-doors to be opened every five or ten minutes; and the frequent stirring of the fire occasions a great deal of the ignited coals to fall through the grate, and upon the floor, whereas in this apparatus the coals are supplied by the machine itself: the fire-doors need not be opened except about twice or three times a day.—Q. Does the fire produced by this appararatus act more regularly or powerfully than the fire supplied in the ordinary way? A. Yes, it does: small portions of coals are introduced on a revolving fire place at certain intervals, so that the fire is regularly supplied; the combustion goes on entirely at the surface, and the incombustible matter, such as the vitrified parts of the coal and the ashes, settle down upon the bars, and protect them from the action of the fire."

Mr. Oldham, of the Bank of England, has invented a plan of revolving paddles, to avoid the defects of the fixed paddles, as now used. He states, that the violent action of the paddles of common wheels, in striking the water in a rough sea, is entirely removed by the use of the revolving paddles, as they enter and rise out of the water with a peculiarly soft and easy motion. The precise merits of this invention will soon be ascertained, as these new paddles are now fitted to the Waterloo packet, which plies regularly between Dublin and Liverpool, and to the Aaron Manby, iron steam-boat, lately sent from England to Havre-de-Grace, to be used on the Seine.

Mr. John Gladstone, of Castle Douglas, has invented another plan of paddles. He employs a pair of wheels at each side of the vessel, having two endless chains acting on them, with paddles fixed on these chains; and so far as the plan has been tried, on a very small scale, it has been successful. Several attempts have been made to get rid of the use of external wheels, but hitherto without success.

Mr. Field has invented a flexible metallic piston, which has proved of great utility.

Your committee have endeavoured to avoid all partiality in the arrangement they have made of the evidence under separate heads, and in their observations upon it; their object has been to bring, as concisely as it was practicable, under the notice of the House, all the prominent advantages and defects belonging to the actual state of steam-navigation at sea; with the opinions of the most scientific professional men upon the best means of improving it. If the frequent reference to the performances of the post-office Holyhead packets should give rise to an impression, that your committee consider them superior to other steam-boats, your committee desire it to be understood, that they do not think any comparison can be fairly made between these vessels and any hitherto built by private companies. In the first place, the funds for constructing them being the public money, admitted of a scale of expense that private companies could not be expected to incur; and, in the next place, those vessels were built for voyages to be commenced at a fixed hour every day in the year, across a sea, exposed to strong tides and heavy gales; that is, for a duty entirely different from the duty of common packets. From the description which has been given to your committee of the new Liverpool steam-boats, the St. Patrick and St. George, the committee are led to expect that these vessels will prove superior to the Holyhead packets, if they have been built of equal strength, in consequence of the great power of their engines, each being provided with two fifty-five horse engines.

The merit of first applying steam-engines to sea navigation is certainly due to the skill and enterprise of the engineers and shipbuilders of the Clyde; for it was, unquestionably, the success of their steam-boats on the Holyhead station, which led the post-office to establish their boats for keeping up the communication between the two countries. At the same time it is but justice to say, that the public are greatly indebted to the post-office for having exercised such a sound judgement, in directing their vessels to be built of that great strength, which has been the cause of their complete success; and which has also established a new principle of certainty and security in the system of steam-navigation.

IV. SAILS.

It does not appear to your committee that there is any probability, at present, of applying sails to steam-boats in any more effectual way than they are now used. Captain Rogers says, "they assist a vessel very much; that they can be used at all times, except within four points of the wind, and that they serve to keep the vessel steady." He recommends a large lug sail forward, a jib, and fore and aft main-sail; to have a square top-sail on board, and a gaft top-sail aft; with means of setting a top-mast, but not to use it unless the engine was out of order. Several plans have been tried for getting the wheels out of geer, and for moving the paddle-boards from the extremity of the wheels towards the centre, and some of them successfully. By these means a vessel, in case the engine cannot be used, may be sufficiently well managed with the sails,

as to carry her safely into port. The evidence of all the other witnesses goes to show, that any attempt to carry canvass beyond a certain moderate quantity will be attended with a great impediment to the steaming power.

The great importance of a thorough acquaintance with every thing belonging to steam-navigation, for securing a certain and rapid conveyance of the public correspondence, where seas are to be crossed, has induced your committee to take this general view of the whole subject as a preparatory step to coming to that part of the order of the House which requires your committee to examine into the conveyance of his majesty's mails between Holyhead and Howth.

Your committee consider the information which has been given by so many distinguished practical engineers and shipbuilders as extremely valuable, and that every praise is due to them for the readiness and zeal with which they have contributed to render the enquiry of your committee of general utility. Not only the post office, but all private companies engaged in steam-boats, may obtain great assistance from opinions derived from such extensive sources of science and experiment; at the same time that the public will be benefitted by those various improvements which they suggest, and which will be the natural consequences of the persevering efforts of the great talents which distinguish these professions in Great Britain.

Your committee, in expressing their opinion, in respect to the proper establishment of steam-boats at Holyhead, concur decidedly with the great majority of the witnesses, who say, that not less than four steam-boats ought to be employed on this service. They recommend, that the vessels should be built of very strong timbers, put together, filled in, and diagonally fastened, according to Sir Robert Sepping's plan; and that they should be coppered, and copper-fastened throughout. They approve very much of the plan of a steam-boat, as described by Messrs. Maudslay and Field, who say, "a steam-vessel and engine to encounter a gale that would bring a stout frigate under her double reefed top-sails, or a good cutter under a three reefed main-sail, should be a vessel of about two hundred tons; both vessel and machinery exceedingly strong; her form, under water, that of the fastest schooner; the centre of gravity kept as low as possible; the projecting works on the sides added to the proper body of the vessel; the rigging to strike completely; the chimney formed to cut the wind; with two fifty-horse engines, every way proportioned to the strength of the vessel." Your committee conceive the evidence, which has been given before them, removes all doubts in respect to the practicability of putting engines of this power in a vessel of 200 tons.

Your committee are of opinion, that every part of an engine for a Holyhead steam-boat, should be made of wrought iron, except where there is no risk of breaking, and should be effectually proved before using it, by a proper proving machine; that the boilers should be made of copper; and that the air-pump, buckets, rods, and valves, should be made of copper or brass.

Your committee particularly recommend, as indispensably necessary for economy as well as safety, according to the opinions of all the witnesses who were examined to this point, that a professional engineer should be employed to reside constantly at Holyhead, to superintend the machinery and inspect the engine-keepers. And also that each vessel should be supplied with an extinguishing fire-engine, and with two large boats, in addition to the ordinary ship's boat.

From the great advantages which may be derived from revolving furnaces, your committee feel anxious that a proper experiment should be tried to ascertain whether they can be used in place of common fire-places.

SPECIFICATIONS OF PATENTS.*

DISTILLING BY STEAM.

BY ELIAS GEIHAUSEN OF HALIFAX, PENNSYLVANIA.

1ST. Upon the necessary platform, is placed a copper still, whereon is fixed a head or goose-neck, connected with a pipe extending obliquely from one side near the top to the opposite bottom of a beer tub, hereafter to be described, to convey the steam. Said pipe has a turn at the lower end of about four inches to give the steam a circular direction round the beer tub.

2d. By the side of the steam still is placed a wooden tub (being the tub above mentioned) to contain the beer which is boiled by the steam, conveyed from the steam still by the above described pipe, and put into circular motion, by means of the turn at the end of said pipe. The size of this tub, for a hogshead still, should be three feet one inch high, three feet two inches diameter at top, and three feet six inches diameter at bottom.

3d. In the upper head of the beer-tub is fixed a copper rim, twelve inches in diameter and three inches high. Fitted into this rim is a copper pipe of the same diameter, twelve inches long, which extends to the centre of a copper globe, two feet three inches in diameter, fastened to the said pipe. In the bottom of this globe, close to said pipe, is inserted and fastened another pipe, four inches in diameter at the globe, and diminishing to the size of three inches at the other end, leading to near the side of a tub hereafter to be described, which surrounds said globe; another pipe connects this pipe with the worm.

4th. Above the wooden tub in which the beer is boiled, and surrounding the aforesaid globe, is placed another tub containing beer, which is headed by means of the globe, and then supplied to the boiling tub below, as occasion requires. The size of the upper tub must be proportioned to the boiling tub and sufficient to supply it, is placed about six inches above. Around the globe is fixed a chain connected with apparatus to turn it agreeably to Anderson's improvement. The whole

*The language used in the following Specifications is that of the Inventors.—ED.

apparatus of the globe and upper tub, being an improvement upon Anderson's and Whitmer's inventions.

The improvement in this particular consists in making the works more simple, less expensive, and more effective in operation.

5th The spirit run from this apparatus through a common worm tub is what distillers call singlings.

6th. Water is conveyed from the worm-tub to the steam still, by means of a copper pipe connecting the two and leading to the bottom of the still, with a cock. A cock is also fixed on the top of the steam-still, to let out the steam, while the still is filling with water.

7th. By the side of, and near to the steam-still, is placed another copper still, of the same size with the other, for the purpose of mashing and doubling, which said last mentioned still is heated by the fire made under the steam-still, communicated by means of flues, which convey the fire first round the steam still, and from thence round the doubler to the chimney.

By the foregoing plan the process of distilling is very much accelerated, and carried on at less expense and trouble, than by any plan heretofore known. I can with one hogshead still, run off and double eight hogsheads of beer in twelve hours, and that without one-half the wood used in the most approved modes of distilling. Both mashing and doubling is carried on by one fire, to full as much advantage as heretofore with two fires.

The quantity of the liquor is superior to that produced by the common methods of distilling: there is no danger of burning the stills, and no trouble in cleaning them.

This plan is an improvement upon the plan of Distilling by Steam, heretofore known and patented, in that it produces *singlings* from the first worm tub, simplifies the process by omitting several unnecessary tubs and pipes; contains the addition of a doubler heated by the same fire applied under the steam-still; and an improved heater or globe in the upper beer tub, thereby rendering a heretofore useles discovery practical and useful.

The form of the pipe conveying the steam from the still to the beer-tub, with a turn at the end to give it a circular direction, is also considered a valuable improvement, as well as the pipe to convey water from the worm tub to the still, and the cock on the top of the still.

Patented, Jan. 14, 1823.

KILN FOR DRYING GRAIN.

BY ROBERT ANDREWS, OF FLEMING CO. KENTUCKY.

THIS kiln consists of two upright walls of above ten or twelve feet in length, nine feet high, and four feet apart; or any other dimensions which may be thought suitable. The ends are also walled up, and the top has a roof or covering: this I call the casing of the kiln. The bottom part of this casing forms the chimney or furnace, where there are two flues

that receive the smoke. The height of the fire-place is about three or four feet, the top forming a platform extending from one end of the kiln to the other. Over said platform is turned a semi-circular arch, of brick or stone, extending the whole length of the kiln, and rising about three or four feet from the platform. The flues are formed close to the casing, one on each side of the fire-place, and extend in an oblique direction upwards between the casing and the arch, to the opposite end where they join a horizontal flue at the top of the arch, from the center of which starts a third flue which extends horizontally on the top of the arch to the opposite end, then rises perpendicularly the requisite height, and delivers the smoke above the roof or top of the kiln. In the vacuum formed under the arch above mentioned is placed a revolving horizontal cylinder, made of sheet-iron or other metal, and of suitable diameter so that it may turn freely within said vacuum. Said cylinder is attached to a centre shaft by arms or spokes in the inside, and extends from one end of the kiln to the other. The ends of the shaft project outward from each end of the cylinder, and are supported by cross pieces, or braces, wherein they turn. The said revolving cylinder receives the grain to be dried at one end by a tube, or gutter, which communicates with the floor or loft which contains it; and after it is sufficiently dried in the cylinder it delivers out at the opposite end in a dried state.

At one end of the shaft of the cylinder is fixed a band wheel by which the cylinder is turned in consequence of being connected with the machinery which is operated on either by water or animal power.

Patented, Nov. 7, 1822.

BRIDLE FOR STOPPING HORSES.

BY PETER LAPORTE, OF RICHMOND, VA.

In addition to the American Horse Checker, the subscriber has invented the means of covering the eyes of carriage horses, with the pulling of the same rein which is used to prevent the horse from breathing and hearing, but, as he supposes it unnecessary to make use of the pieces, communicating to the nostrils, after several successful trials, he is fully convinced, that without the aid of the nostril pieces, any horse may be subdued, by being deprived of his sight and hearing; as they are generally frightened by what they see or hear. This improvement consists only of two small strings, which are fastened to the upper part of the chains, which close the horse's ears, and run down in a cross way direction, through a perforation which is on the top of a piece of metal, that is fixed to a leather strap, (called the face pieces) and then each end of the small strings are tied to a small eye, which is fixed to the blind of the bridle. This operates by means of a round rein, sewed to the ends of the chains aforesaid, which embraces the compass of the horse's ears, and run through staples, with a roller at the lower part of the said staples, which are fixed to two iron plates about five inches long, that has a hook to hitch the other end of the said chains;

the said plate has a rounding edge in front, so as to be a bearing to the horse's ear when pressed against it, without injuring the ear. The said two plates are fixed within about an inch and a half from each other, in the crown piece of the bridle. The chains are put in use (when required) by a round rein, which runs through the staples, and down the cheeks of the bridles, to two rings fastened to the said cheeks, one close to the blind, and the other just above the bit of the bridle. In the centre of the round reins and between the two lower rings, at the bit of the bridle, there is a loose ring, in which the said round rings run through. The check-rein buckles to a ring, that is fixed at the lower part of the horse's collar, and through which a short martingale, having a ring big enough not to pass through the ring where the check-rein is buckled, to keep the collar always close to the horse's shoulder, and then carried through the loose ring, and from thence the reins are brought to the foot board, or to any part where the driver can reach them conveniently, to make use of them when necessary. For the saddle horse the check-reins operate in the same manner as for the carriage horses, with this difference, that there are no blinds to the bridle, although some artificial ones might be adopted to the cheeks of the said bridle, and used by the means of spirals or flat springs. The check-reins are buckled to a martingale, that does not come above the point of the shoulder of the horse, then run through rings that are fixed to the lower part of the round reins, communicating to the chains that closes the horse's ears, and then brought on the horse's neck, to be used at discretion.

Patented, Aug. 15, 1822.

FERMENTING APPLE-CIDER.

BY WILLIAM ELDER, OF NEW BRUNSWICK, NEW JERSEY.

YEST prepared in various ways may answer the purpose; but yest prepared in the following manner will be found as suitable and useful for the purpose, as any other, if not more so. But this preparation is not to be considered a part of my discovery.

To make good yest, take one bushel of good rye flour fresh, two pounds of rye malt and four pounds of barley malt, ground very fine. Put about sixty gallons of water in a kettle or tub, and throw into the same about two pounds of good hops and mix them with the water. Then cause the said hop-water to boil thoroughly. After the said hop-water is thus boiled, take about four gallons of it while boiling and put it into a tub, first filtering it through a sieve which may be placed over the tub, so as to separate it from the particles of hops. Then throw into it, the said rye-flour and the said rye and barley malt, to which you will immediately add eight gallons more of the said boiling hop-water, filtered as abovementioned. Then mix and stir the whole composition and mash it well with sticks or paddles, so as to prevent it from being lumpy; then add to it twenty-four gallons more of the said boiling hop-water, filter-

ed as abovementioned, mixing the whole together, and continually stirring it occasionally for three or four hours. Let the remainder of the hop-water be cooling in the mean time, and when it is about lukewarm throws it all into the tub, first filtering it as abovementioned, at the same time put in about four or five gallons of baker's yest, and mix the whole well together. Apply the thermometer to the composition and bring it to a temperature of about ninety-six degrees of Fahrenheit, throwing in a small quantity of cold water if necessary, to reduce it to that temperature. That temperature of the composition will answer when the atmosphere is at a temperature of forty or eighty degrees, or between them. If the temperature of the atmosphere should be below forty degrees you may raise the temperature of the said composition, by throwing in boiling water, if necessary, in the proportion of one to two, and if the temperature of the atmosphere should be above eighty degrees, you may lower the temperature of the said composition by the application of cold water, in the proportion of one to two, so that if the temperature of the atmosphere should be thirty degrees, let the temperature of the said composition be one hundred and one degrees, and if the temperature of the atmosphere should be ninety degrees the temperature of the said composition be about ninety-one degrees.

The yest thus prepared and tempered, may be used in the forced fermentation of the said apple-pumice or apple-cider in the following manner, viz.

Have the apples ground fine. Put the apple-pumice, when thus ground, into a tub or cistern, diluting it with water either cold or warm, so as to bring it, when thus diluted, to a temperature of about eighty or eighty-two degrees of Fahrenheit. In diluting it apply water in the proportion of about fifty gallons of water to a hundred gallons of the pumice. Then throw in a quantity of the yest, in the proportion of about seven or eight gallons of yest to a hundred and fifty gallons of the apple pumice thus diluted, and mix it all up together. Let it, when thus mixed, stand for fifty or sixty hours, or thereabouts, when it is fit for distillation.

If the cider is expressed from the pumice, add a small quantity of warm water or cold water, if necessary to bring the cider to a temperature of about eighty-two degrees of Fahrenheit. To a hundred and fifty gallons of the cider, thus prepared, add about seven or eight gallons of the yest, mixing them thoroughly together. Let it, when thus mixed, stand for fifty or sixty hours, or thereabouts, when it is fit for distillation.

The cider or apple pumice, when prepared in this way for distillation, by a forced fermentation, by the application of yest, is preferable to the cider fermenting in the common way, because it will furnish a greater quantity of the apple-brandy or cider-spirits, and the fermentation is more expeditious.

Patented, Aug. 21, 1822.

KNIFE FOR SPLITTING LEATHER.

BY HERRICK AIKEN, OF BRIGHTON, MIDDLESEX CO. MASSACHUSETTS.

Description of the Splitting Knife,

WHICH is a useful and valuable tool for saddlers, harness-makers, coach and chaise-trimmers, collar-makers, shoe-makers, book-binders and other workers in leather. The blade and stock are similar to a spoke-shave, with some variation in the form and shape. The inventions or improvements are: 1st. Applying traversing nuts, or nuts fixed into a plate of iron, with a shoulder on one side and a washer on the other side of the plate; and the plate fastened to the stock, (the shanks of the knife screw into the nuts) so that turning the nuts will raise or lower the knife. 2d. Fixing irons on the ends of the stock, with a square shank extending below the nuts, with a small shoulder, and a tapering round part below, to confine the tool for use. 3d. Two slides, which are placed before the edge of the knife, and fastened or removed with a screw, that works in a nut which is fixed in the centre of the stock: one slide has a stop or shoulder on each end, the other has one in the middle, with a long and short bevil. These inventions, or improvements render the said splitting knife so convenient and easy to be used, and saves so much labour and stock, that it is the opinion of the inventor it will be of great utility to be circulated.

Directions for using the Splitting Knife.

Make two holes in your bench, about an inch from the edge, or in any convenient place; so that the shanks of the tool will exactly fill the holes to the shoulders on the round parts; which will confine the tool for use, and may be removed at pleasure. Any parts of harness leather, or any other leather, may be worked with ease, into facings, bindings, strips for braiding, welts, loops, thongs, &c.; and every strap in a harness, saddlery, and other work, may be drawn through, to take off the fleshy part, to make it smooth and even, and cut to any thickness that may be worked with ease, which would be lost or used with difficulty.

The slides are for the use of shoe-makers, (as most all shoes and boots have welts on the edge of the soles, which are required to be thick at one edge, and thin at the other;) these slides can be moved and fastened with ease, to make a wide or narrow welt, with a long or short bevil, and the blade may be altered to make it thick or thin, as occasion requires. If it is desired to make the bevil on the grain part, it must be drawn through separate from the slide, to make it even; then draw it through on the slide, with the grain uppermost. If the welt is cut a little wider than is necessary for one, it can be split so as to make two. If the bevil is not exactly as is desired, it can be altered by filing the bevil on the slide. Boot straps, side welts, bindings, &c. may be brought to any thickness with the greatest ease. All straps and pieces should be wet, and free from dirt and gravel, with one corner, or end, shaved so thin as to put it under the edge of the knife; then with a pair of pincers,

draw it through with one hand, and steady it with the other; which is done in an instant.

The knife requires a very fine, smooth edge; which is kept so with very little trouble.

Both nuts must be moved together, and may be set or altered to any thickness that is desired, by looking at the edge of the knife.

IMPROVEMENT IN HAMES.

BY HERRICK AIKEN.

The improvement on coach and chaise hames will render the hames cheaper, more durable, superior in neatness and elegance, not subject to chafe and deface the plate, nor wear the collar, (as is always the case with the common kind;) and likewise save much labor, in attaching the traces to the hames. This improvement is on the part that is attached to the trace, which is made in the right shape to fit the collar, in a solid part that joins to the hames, and extending in two parts, so as to admit the end of the trace between, with a rivet, or screw, put through to hold the trace which will give play to the trace to move up and down.

It is also the opinion of the inventor, that this improvement will be a public benefit to be brought into general use.

Directions for using the Hames.

If the end of the trace be of soft or spongy leather, shave off the fleshy part so as to make it thin, and put a piece of firm, solid leather in the middle, about five inches in length; with one end shaved to a thin edge, and the other so thick that the end of the trace will fill the hames; which requires to be thicker than the rest of the trace, to prevent it from bending short at the hames. Mark the trace, where the rivet will go through, then punch a very small hole, make it wet, and with an iron or wooden tool, work it large enough to admit the rivet; which will render it sufficiently strong and durable.

Patented, March 12, 1823.

IMPROVEMENT IN THE GRAIN CRADLE.

BY ISAAC BABCOCK, OF RENSSELAERVILLE, NEW YORK.

Be it known that I the said Isaac Babcock, have invented, constructed, made and applied to use a new and useful improvement, to the implement of husbandry called the Grain Cradle, specified in the words following, *viz.*: This improvement in the common grain cradle, consists in a back or spring sneath, by means of which the frame of the common cradle is set back so as to give the whole cut of the scythe. This back or spring sneath receives the foot of the post, and braces from the fingers,

and is regulated by means of a screw and nuts, so as to set the cradle fingers forward or back, that is, to make them longer or shorter upon the scythe as the situation of the grain may require. This improved cradle, may like the common cradle be made to a scythe of any length, but it is calculated that it will answer best fitted to one of about three feet nine inches. To make one to a scythe of that length, the main sneath ought to be of firm tough wood, about four feet and a half long, shaved round and smooth, and left about one and one half inch diameter at one end and gradually tapered to about three fourths of an inch at the other; let it then be bent or curved gently in a frame or otherwise (say two or three inches from a straight line,) so that it will hang the cradle natural and easy. The main sneath being fitted in this manner, prepare your back or spring sneath, which must be of good timber, shaved out about one and one-fourth inch square at each end, and rounded off, or made smaller, in the middle that it may spring. This spring is then to be lapped and riveted to the back of the main sneath, at the distance of about fourteen or fifteen inches from the butt or large end. The neb or thowl, being an iron ring, with a crooked shank of about eight inches in length, with a handle of wood, is then to be placed on the main sneath, one foot and nine inches from the butt thereof. The scythe is then to be fitted to the main sneath, and secured by what is called a common heel ring and heel wedge. The regulating screw to pass through the spring sneath, about three-fourths of an inch from the lower end of it, into the main sneath, where it is fastened to the main sneath by being headed on the inside, and by a nut run down upon the screw on the outside, which screw must be of sufficient length to extend the spring sneath five inches from the main sneath, with nuts on each side of the spring sneath, to keep it firm in its place.

The post that receives the fingers may be about three-fourths of an inch square and two feet long, is to be set into the back or spring sneath, about one and one-fourth inch from the lower end. This post is supported by a brace extending from near the top of the post into the main sneath, opposite the lap of the spring sneath.

The fingers, four in number, to be got out about five-eighths of an inch, and three-fourths of an inch broad at the broad end, and gradually tapered to a point at the other; and when suitably bent and set to fit the curve of the scythe, the large ends are to be tenoned or set into the post, the first one is to be raised three inches from the scythe, the other three to be placed above at the distance of seven inches from centre to centre. A slat of three-fourths of an inch in width and one-fourth of an inch thick, is then passed through the fingers, parallel with the post, at the distance of six inches therefrom. The fingers are then braced, by a brace extending from each of them, about three-fourths of an inch forward of the slat, into the spring sneath. These braces are round, smooth wood rods of about three-eighths of an inch thick, and secured by small nails in the post and sneath. For the purpose of bracing the cradle and keeping the lower finger always at a suitable distance from the scythe, let a hole of one-fourth of an inch, or less, be drilled through the scythe, about three and one half inches from the heel; then prepare

a wooden or other tube of sufficient length to stand between the scythe and lower finger of a bore suited to the hole in the scythe; let a mortise of one inch in length be made in the lower finger, corresponding with the hole in the scythe; then prepare an iron screw, with a suitable head, pass the screw through the scythe, tube and finger, and let it be screwed down with a nut on the upper side of the lower finger; this will brace the scythe and admit the regulating of the fingers.

The common grain cradle is made, as will easily be discovered, by omitting the back or spring sneath, regulating screw, and slip mortise, in the improved cradle, and setting the post that holds the fingers into the butt of the main sneath, which removes the braces across the scythe, more or less, as people may choose generally, from five to seven or eight inches from the heel. Cradles ought to be made of firm tough timber, and kept secure from wet to preserve them long. The *common* grain cradle is an important implement to the husbandman. It is used in cutting wheat, rye, oats and other grain of the kind. With a cradle, a person who has learned the use of it, will cut several acres of grain in a day and lay it in swath. It is believed (and as I think demonstrated by actual experiment) that the improved cradle, by giving the advantage of the whole cut of the scythe, and permitting the regulating of the fingers, to suit the situation of the grain, whether it be thick or thin upon the ground, standing erect or leaning, will enable the workman to cut considerably more in any given time, and do it more savingly.

Patented, March 24, 1823.

PRESERVING BEEHIVES FROM WORMS.

BY SIMON C. WILLIAMS, OF SHENANDOAH CO. VA.

An outer case either round, square, or otherwise, of diameter and length as may suit fancy or convenience; the inner hive to be constructed of slats fastened to the head which admits of taking out, and being returned in the same case, or another, with ease; the slats may be fewer or greater in number, running lengthwise from the head to near the bottom of the stand, with cross or horizontal sticks to support the comb. The perpendicular slats to be from a quarter to half an inch assunder, and the space from the inner gum to the case, from one eighth to a quarter of an inch. One extra outer gum or case, to be always kept in readiness. Whenever you discover that the worms or insects are disturbing your bees, take out the inner gum, clean the bench, and kill the obnoxious animals found thereon. Set your extra case precisely in the same place, and return the inner gum. Previous, however, to returning it you must be careful to examine whether or not any worm or other insects have got into the comb; if so, they must be removed. You will then proceed to clean your case by scraping off the web of the worm, and burning the case with a light blaze, from straw, shavings or any other light combustible substance.

Patented, May 14, 1823.

FIRE-PROOF FURNACE FOR DISTILLING, &c.

BY JOHN MILLER, MASON, OF NORTHAMPTON, PENN.

THIS furnace or engine is made in the form of an oblong square or box, cast water tight, and filled with water; so that the water flowing around all its sides, preserves the plates from the destruction of fire. In the centre there is an open space left to receive the fuel, extending part of the length of the engine, but leaving a distance sufficient for the water to communicate with the two sections or oblongs formed by this space, and to preserve the end plate from the destruction of fire.

On each side of the space left for the fuel, two flues are made to receive the smoke of the furnace and lead the heat around the kettle.

In the top plate a hole is left to let the steam, arising from the boiling water, escape.

In the top of one of the side plates a hole is left to convey the water in the engine to fill it.

In the bottom of one of the side plates a hole is left to receive a cock to discharge the boiling water when wanted for use.

The mode of using this furnace or engine is by placing it under the kettle of a distillery, hatters' shop, or brewery, the water heated by the engine is used for mashing, scalding casks, &c.; the steam, for drying malt, &c.

Patented, March 13, 1823.

GRASS BONNETS.

BY MRS. SOPHIA WELLS, OF WETHERSFIELD, CONN.

THE *species* of grass is generally known by the name of *spear grass.* Of this, there are two or more kinds which may be used. One is commonly called *red top*; but the better kind, and the one which I have generally used, is called *spear grass, English spear grass,* or *English grass,* and grows spontaneously in pasture and mowing grounds, in various part of the state of Connecticut, a specimen of which is deposited in the Patent Office. That part only is used which is above the upper joint. The grass is to be gathered between the time of its blooming or flowering, and the time when the seed is nearly matured. It is then to be immersed in boiling water, or boiling water poured upon it, and then dried in the sun; and this operation repeated until the grass looses its green color and the leaves, which sheath the stem, will slip off. It is then to be bleached by first moistening it with a solution of pearl-ash, and then fumigating it with brimstone, until the grass becomes dry. It is then ready for plaiting or braiding. This is done in the same manner and form as the common Leghorn braid. The braid is then to be sewed together, or connected by passing a thread through each of the outside strands of the braid, according to the method practised in the

manufacture of Leghorns, and shaped into flats, bonnets or hats of any shape or form. It is then to be fumigated again with brimstone and pressed with a moderately heated iron.

Patented, December 29, 1821.

GRASS HATS AND BONNETS.

BY LUCY BURNAP, OF HILLSBOROUGH CO. NEW HAMPSHIRE.

My invention consists in weaving grass in a loom into a warp of silk thread, or other thread or filament, and thus producing a web for the making of hats and bonnets.

Patented, February 15, 1823.

EXTRACTING THE TANNIN FROM BARK.

BY WILLIAM KNAPP, OF MILFORD, OTSEGO COUNTY, N YORK.

The bark is first stripped or cleared of such of its parts as do not contain tannin; it is then broken up and pulverized by beating or grinding, and put into a vat, leech, or other suitable vessel, having a hole or holes in the bottom. Water is then added, either cold, hot, or of any intermediate degree of temperature; or steam may be conveyed into the mass, by any of the modes in use, and employed to obtain the extract or tannin. A screw press, or other adequate pressure, may also be employed to facilitate the operation.

The object of this part of the process is to extract from the bark, or other vegetable matter, its tannin, which is thus readily imparted to the liquid menstruum, which passing through the mass, descends through the hole or holes in the bottom of the leech, vat, or vessel, into a vessel or vessels below, placed to receive it. Instead of a leech or vat, as abovementioned, a suitable metallic vessel may be employed to boil the bark, either pulverized or only broken, and the saturated liquor drawn off and evaporated.

The principal object of this improvement is to bring the tannin into the most portable form or state, which is effected by subjecting the saturated liquid to natural or artificial evaporation, which may be continued until the tannin becomes a thick fluid, or until it becomes a solid mass, which is its most convenient form for transportation.

It is afterwards easily reduced to the proper consistence for use, when required, by dissolving it in water, either hot or cold, the proportions being regulated by experience.

For employing this tannin in tanning leather, the vats may be either over or under the surface of the ground, and the hides or skins should be strung or otherwise fixed therein, either horizontally or other convenient position, having a small space between every two, so that one shall not touch the other. They must then be kept surrounded by the tannin

liquid, of which fresh portions are added, as occasion may require. After the liquid has parted with its tannin, it becomes liable to fermentation, which is injurious to the leather. It should then be all drawn or pumped off, and a fresh supply put into the tanning vat; and this process continued until the leather is sufficiently tanned.

Patented, April 5, 1823.

MAKING ISINGLASS.

BY JOHN HASTINGS, OF CAMBRIDGE, MIDDLESEX CO. MASS.

I TAKE the sounds from the fish, as soon as consistent after they are caught,—hastily open and separate the coagulated blood with a knife; then put them into cold salt water (fresh will answer,) stir them once in fifteen minutes for two hours, so as to cleanse them thoroughly from blood. Pour off the salt water and add fresh water to the sounds, which can now be taken out singly, and with a sharp knife free by peeling and scraping from both sides, the membrane and all foreign matter. Soak and wash them out in repeated portions of water, till it has no milky appearance, (If in hot weather the isinglass becomes tainted, or as a preventive, soak it several hours in a solution of one-half ounce of white vitriol in ten gallons of warm water. The isinglass, so restored, must not be used in the composition of food.) The sounds are now to be exposed to the sun till partially dry, and passed through a pair of wooden rollers similar to a copperplate printing press, and again exposed to the sun and air till thoroughly dried.

To eradicate any Fishy smell.

Pack the isinglass in a tight cask; perforate one head with several holes, one or two inches diameter; dig a hole in the earth about two feet deep, large enough to receive the cask; then place the perforated head into the hole, banking it round with earth, and let it remain in this situation twenty or thirty hours.

Patented, Aug. 14, 1822.

WOODS'S PATENT NURSING CHAIR.

BY ANDREW WOODS, CHARLESTOWN, VIRGINIA.

THIS chair may be made in the following manner: The legs of the chair are composed of four curved pieces; the back legs in the form of one side of a pair of hames; the end, similar to the one that receives the string, turns down to the floor; and the other, which is the straight end, turns up, on the top of which there is a tenon that receives the end of the arm. The front leg rises in a gentle curve, inclining backwards, and rosses the back leg opposite the seat, and rises in a long limb falling

behind, at the top of which there is a cross piece coupling the side frames together. There is, at the crossing of the legs, a strong piece framed into the side frames, and at *that* part of the chair is coupled with bed-screws. From the top of the back leg (as before mentioned) the arm, extends up the end of the front leg to the top, which is of a proper breadth to be easy, and is stuffed. The back and seat of the chair is one continued piece of canvass, or some strong flexible material, one end of which is attached to the seat piece, and the other to the top *cross-piece*, which piece may be stuffed for the head to lie upon, or made to rise quite above the head, without stuffing. The chair is made either with or without a cushion, which runs over the seat and fastens below; from thence runs up, following the seat and back up over the top of the top rail or cross piece. The cushion may be put on permanently or to take off occasionally. The chair may be made with or without rockers; when there are rockers, there is a step that runs across the points of the rockers in front, that serves to rest the feet upon. When you are in the chair you are in a very reclining position, as if in bed, bolstered up a little. The chair may be made either without a covering, which has nothing to do with the construction of the chair, except with a view to ornament it. A strip of linen, or any other material, for ornament, hangs over the back frame and sides of the chair, ornamented or not, according to inclination.

Patented, March 13, 1822.

TINNING SHEET LEAD.

BY THOMAS EWBANK, OF N. YORK.

HAVING procured a wide and shallow iron pot, whose width is sufficient to admit the width of the lead to be tinned, I open the sheet of lead, of whatever size it is, and make the surface bright, by scraping or carding all dirt or oxide from it, after which I smear it over with tallow, or sprinkle powdered rosin over it, when it is prepared for tinning.

If both sides of the lead are to be tinned, then both are prepared in the same way; but if one side only of the lead is to be tinned, then that side which is *not* to be tinned, is brushed over with lamp-black and size, mixed together to the consistence of cream or paint, which, when dry, prevents the tin from adhering to that side.

Block or grain tin is then melted in the iron pot, till there is sufficient in depth to cover perfectly the thickness of the lead to be tinned, taking care to skim from the surface all dross, oxide, or dirt whatever: I then slide one end of the sheet of lead into the melted tin, at one end of the pot, and gradually draw it out at the other end, till the whole sheet has been immersed in the tin, and become tinned.

The temperature of the melted tin, is the most essential point to be attended to, because there are not very many degrees between the melting point of lead and that of tin. The safest way is to apply as much fire to the pot as will but just keep the tin in a liquid state, or two or

three degrees higher, and no more; otherwise, it would be in danger of melting or dissolving the lead while passing through it. The cooler the tin is, the slower must the lead pass through it, and *vice versa*.—Or,

I take the lead after it is cleaned and ready for tinning, and roll it up like a scroll, but taking care to keep the folds from touching each other, and then dip it perpendicularly into a pot, containing liquid tin, sufficient in depth to cover the lead, and after it has remained a few seconds according to the heat of the tin, I lift it up, when the superfluous tin runs off, much in the same way as those sheets of iron are tinned from which is made tin ware, commonly so called.

Patented, May 30, 1823.

IMPROVEMENT IN PLANKING VESSELS.

BY JOHN THOMAS, OF WASHINGTON D. C.

THE plank or thick stuff that composes the sheer streaks, channel-wall, mainwalls, diminishing stuff, clamps, and spirketings, differs from the common mode of planking, as follows: All the butts, except the fore and after, and where the edges are required to work fair, are to have about one inch rising wood, forming on each edge hooks, or jogs; these hooks or jogs should not be less than four feet, but as much longer as the plank will admit. The length of the hooks or jogs, as described, is supposed to be in planks of twenty-four feet lengths; if the planks should work longer, the hooks or jogs should be proportionably longer. When one streak of planks is fastened to the ship's side in the manner before described, it will be necessary to take off, on a rule or spiling-staff, the jogs or hooks, and transfer them to the streak of planks which is to come in contact with the planks in place; and thus will be formed in the second streak, recesses to receive and embrace the hooks or jogs formed in the first streak; so that by pursuing the method as described, all the plank as before described, will be connected, supported, and bracing each other, resembling one entire piece. The method to be observed to lay off my mode of planking is to set off on the side of the ship, lines resembling the common mode of planking; these lines are to be shown with chalk. The next thing to be done is to set off the butts, which must be regulated according to the lengths of the planks provided for the purpose; when the butts are marked on the timbers, set off the jogs, or rising wood, as before described; when this is done race, or scratch on the timbers all the hooks or jogs. This being done, rub out all the chalk lines resembling the common mode of planking, and my mode of planking is clearly and accurately laid off. The projecting wood, forming the hooks or jogs, may be more or less than one inch, and made water tight, by the common mode of caulking. These parts may be performed as the nature of the works may require; a deviation from either I shall not consider of any importance.

Patented, Dec. 2, 1822.

IMPROVEMENT IN LAMPS.

BY CHRISTIAN CORNELIUS, OF PHILADELPHIA, PENN.

THIS improvement consists in a cheap and effectual mode of increasing and magnifying the light of one or more burners, by means of double reflectors, compounded of arched and flat surfaces, which multiplies and magnifies the rays of light, owing to their verging and converging, alternately, through each other, and may be applied to lamps of various forms and adapted to different situations, agreeably to the taste of the artist.

When suspended from a ceiling it projects little or no shadow, which is not the case with most other lamps, owing to the oil being situated under the burner. In the improved lamp, it is placed in a reservoir above the reflectors, and is entirely out of sight, is let down in just proportions to what is consumed, through a small tube which supports the burner.

The reservoir of oil is rendered air-tight by a screw which is let into it, the lower end of which operates upon a valve that closes the feeder, while the screw is out, and during the operation of supplying the reservoir with oil; after which, the screw being returned to its place, and while in the act of screwing it in, it not only renders the reservoir air-tight, but its lower end presses upon a short lever, similar to the key of a German flute, and opens the valve, whereby the oil is let down and descends into the burner, where it flows to a certain height, which is constructed upon the same principle, or similar, to a bird's fountain; and as the oil is consumed the air enters the tube and ascends up the feeder to the reservoir and relieves the oil from its air-tight situation, which would otherwise remain stationary.

The under part of the reservoir constitutes the reflector in this lamp, which is formed of long excentric arches, radiating and widening to their extremities, through the centre of which there is an opening, and under this opening the burner is placed. The glass common to all lamps is then placed over the blaze and conducts the heat and the smoke through the opening, and, of course, through the reservoir, which has a tendency to warm the oil, and prevent it from congealing or freezing should it be exposed to cold.

It is not, however, always necessary or essential to place the oil above the reflectors. In lamps intended to be placed against a wall, or at the extremity of a street or alley, a portion only of the compound reflectors is requisite, and the oil may be placed behind: while the combination of arched and flat reflectors may be so adjusted as to concentrate the light and project it in any given direction, which combinations are capable of so many changes, that it is impossible to define their extent, or the variety of uses to which they may hereafter be applied.

In applying this improvement to a passage or hall, the lamp may be so managed, that a portion of the light may be reflected so as to fill the

passage, while other reflectors, reversed, will collect an equal portion of it, and fill the whole stair case with a brilliant effect to the top of the house.

Patented, Dec. 28, 1822.

MAKING WATER-PROOF BOOTS AND SHOES.

BY ARNOLD BUFFUM, OF SMITHFIELD, RHODE ISLAND.

For the soles of boots or shoes, I prepare a piece of pasteboard with oil, and then coat it thoroughly with Japan, made by boiling one quart of oil with four ounces each, of red lead, litherage and umber; when the oil is very hot, one pound of gum shellac is added, and being well stirred till the gum is dissolved it is set by to cool, and is gradually diluted with spirits of turpentine to a thin varnish. The proportions of the materials may be varied, or the common copal varnish may be used; the oil and gum being the essential articles to render the paste board impervious to water. The paste-board being first well filled with oil, is varnished over on both sides until it is thoroughly covered and shielded from wet. The paper thus prepared, is put into the soles of the boots or shoes, being the whole bigness of the sole, prevents the water from penetrating to the feet. For the upper leather, I make a black ball of baberry tallow, and the above described Japan; leaving out the spirit of turpentine, or adding it in a smaller proportion, according as I wish the ball to be hard or soft: this is made black by the addition of ivory or lamp black, and is applied to the upper leather, from time to time, in the usual manner of applying black balls. The improvement claimed, in both cases, consists in the application of the Japan or varnish, made of oil or gum, to said purposes.

Patented, Dec. 28, 1822.

BLOCKS AND WEDGES.

BY JOHN THOMAS, OF WASHINGTON, D. C.

Blocks in common use are of one, two, and sometimes three solid square logs, making in all about two feet in depth; and about seventeen inches broad. My blocks are composed of two pieces, ten inches thick, seventeen inches broad, and five feet long; and two wedges, each eight inches broad, six feet six inches long. The upper part of the lower block, and the lower part of the upper block, have an inverted inclined plane, of about five degrees inclination. The inclined planes form a guide for the wedges, which are applied at each end; and when placed under a ship, are driven in or driven back by two battering rams. The battering rams are made of live oak, about nine inches square at the large end, tapering to six inches, and twelve feet long.

Note. All the dimensions here given may be a little altered without either much injury or improvement to the blocks and wedges here described. This alteration I should not consider any invention, but rather interfering with mine.

Patented, May 17, 1822.

IMPROVEMENT IN SADDLE TREES.

BY CHRISTOPHER KURTZ, OF LANCASTER, PENN.

THE saddle tree is like any other common saddle tree, only in two pieces, and attached together with a steel plate or spring of two inches broad, and one and a half inch long in the clear from any wood placed at each side of the bars, which will attach the two pieces of the tree together, which will make an elastic saddle tree, that will be easy for the rider and easy for the horse; and so durable and strong, that a man may carry any burden on the saddle. The rider will have such an easy seat, he may ride a very long time without feeling sore at his seat. It will be only a small expense more than common saddles.

Patented, May 28, 1823.

IMPROVEMENT IN HORSE SHOES.

BY JOHN B. BROWN AND JONATHAN FARMER, OF BOSTON, MASS.

THIS improvement consists in fixing the moveable steel caulks upon the shoe, in such a manner, that they shall be supported on all sides, which renders them more substantial caulks, than have ever been made in Europe or America. The shoe is made in the folllowing manner:

1st. *To make the toe caulk.*—Weld a piece of iron on the shoe, similar to the piece of steel, commonly welded on, in steeling a shoe, as a caulk. Then punch a socket in this piece of iron, which has been welded on, sufficiently large to receive a steel moveable caulk of a suitable size.

2d. *To make the heel caulk.*—Turn down the heels of the shoe, so as to make a blunt caulk, similar to those sometimes made on summer shoes; then punch a socket in each, of a sufficient size to receive a suitable steel moveable caulk.

3d. After the steel moveable caulks are inserted a hole is to be drilled or punched through each socket, and through the steel moveable caulk at the same time, or they may be drilled or punched separately. A rivet is then to be put through these holes, so as to confine the moveable caulk in the socket, and clenched.

Patented, March 11, 1822.

FORGE HOLLOW FIRE.

BY SAMUEL COLLINS, OF SPRINGFIELD, MASSACHUSETTS.

THE Forge Hollow Fire is so constructed that it does not admit of being intelligibly exhibited by a drawing in perspective on paper. A front view is exhibited on the third page of my papers deposited in the Patent Office, and on which this patent is issued; the lines marked with red ink denote the *improvement*. The materials used in constructing and building a forge hollow fire, are best English fire bricks, cast iron plates and clay. The size varies according to the strength of the blast. They can be worked either with one or two tewels or bellows pipes. The foregoing improvements are marked A and B. A is termed the cock hole, in which there is an outer fire, in which the iron or steel is first heated, previous to being placed in the hollow fire. B is the top of the fire which is flat. Previous to my improvement the tops of forge hollow fires were arched or oval, which were by no means equal to the flat tops.

The use of the forge hollow fire, is for heating iron and steel for welding and drawing, and it is attended with a very great saving of fuel; and as the substance to be heated, does not come in contact with the coal or fuel, but is heated entirely with *flame*, the metal is not liable to be scorched or injured; the texture remains perfect, or is rather improved by heating in the hollow fire. Another important advantage is derived from hollow fire: they are so constructed that one, two, or more apertures, may be used for heating; and a welding heat may be taken three times the length of one taken in the common open fire; besides the advantage of having several irons, or whatever it may be, heating at the same time, the saving of time, fuel, iron and steel, in drawing gun skelps and manufacturing scythes, is incalculable.

The expense of materials for a forge hollow fire are but trifling. They are easily constructed, and when constructed, are far preferable to all other fires for heating or welding iron or steel.

Patented, Sept. 11, 1822.

IMPROVEMENT IN CANAL LOCKS.

BY GEORGE BENDER, OF NEW YORK.

SUPPOSE two locks, constructed in the usual manner, one below the other, and two other locks of the same dimensions placed by the side of them: Let the two on the right hand be filled with water (the upper one of which we will denominate A, and the lower one C,) and the two on the left hand remain empty, (the upper one of which we will denominate B, and the lower one D.) Now suppose boats waiting to descend, and others to ascend: let a descending boat enter A, and an ascending boat enter D, close the gates of those two locks, and let off

the water from A, into D, by means of a pipe leading from the bottom of the one lock, diagonally across the line of the partitions, to near the bottom of the other. The descending and ascending boat will then be on the same level, and the former may be floated into lock C, and the latter into lock B. And while letting off the water in C, to the level of the lower canal, and passing out its boat; you may fill B, from the upper canal and pass out its boat. The locks are now again ready for she same operation; the descending boat entering B, and the ascending boat, entering C.

Patented, August 26, 1822.

TRANSFERRING IMPRESSIONS TO WOOD, &c.

BY ASHLEY C. BAKER AND M'F. B. MERCHANT, OF ALBANY, N. Y.

Be it known that we have invented a new and useful improvement, not known or used before, by which any picture, device, landscape, description, or other piece, historical, emblematical, fancy, likeness, or other impression taken on paper from copperplate, or other metal, or from wood, may be transferred in all the beauty and accuracy of the original, to wood; and thus preserving, in greater durability, on chairs, furniture, or otherwise on wood, the impression you choose to select. The improvement, or *modus operandi*, is as follows:

The board, or wood, to which the impression, above referred to, is to be transferred, must have a smooth surface, and be painted with any colour most agreeable to your taste, and must be varnished in the ordinary way of varnishing on wood. While the varnish is fresh and not entirely dry, take the impression you have selected as aforesaid, and which must also be fresh and not entirely dry, and lay it on the wood or board before mentioned; pass it through a rolling press on the wood or board; and immediately after, with a wetted sponge, wash the paper off the wood, and the impression will be complete on the said wood.

Patented, February 7, 1822.

REFRIGERATOR.

BY JOHN W. BRONAUGH AND JESSE TALBOT, OF GEORGE TOWN, D. C.

This Refrigerator is a chest of six feet long, two feet wide and two feet deep in the clear. In this chest another is to be placed five feet eight inches long, one foot eight inches wide, and one foot nine and a half inches deep, from out to out: before the inner chest is placed in the outer, the outer one is to have the bottom covered with dry pulverized charcoal, two inches deep. On this layer of coal, is to be placed the inside chest, which will come up within half an inch of the top of the outer one; the space of two inches, which will remain at both ends and the

sides is also to be filled, with dry pulverized charcoal; and pains must be taken to have this coal well put in to prevent it from settling otherwise, the air would be admitted. After this operation is completed, a covering board of a half inch in thickness is to be placed on with perfect joints, so as to connect the inner and outer chests, and well nailed on. A top then is to be put on with hinges of sufficient strength in the common mode used; care should be taken in placing on the top to make the joint all round perfect; then strips of plank well jointed are to be dowelled all round on this top, of two inches deep: this will leave a space of two inches deep all over the top, this space is then also to be filled with dry pulverized charcoal; after this is finished, another top must be put on and dowelled down, so as to make a perfect joint. The inner chest will then have two inches thickness of pulverized charcoal all around. At the two ends, and on one side, there must be a moulding put on, to fall below the joint, between the top and the chest, half an inch. This moulding will entirely cover the joint on all the chest, except the back where the hinges are placed. To prevent any possible admission of air through this joint, there must be thin baize or flannel pasted on, which will entirely close the joint.

The inner part of this refrigerator is to be divided as follows, to wit: At each end there must be shelves placed on ledges, at such distances from the bottom, as to admit under them, and on them, the articles intended to be cooled. Exactly in the center, a tin pan is to be placed, about two inches deep, two feet long, and just wide enough to go down by pressure to the bottom. At bottom of this tin pan, and at one edge, there is to be a tube placed, half an inch diameter, and made sufficiently long to go through from the inner chest charcoal and outer chest. This tube must be constructed on an angle sufficient to carry the water from the pan out. In the tube there must be inserted a wooden cock, through which all the water that falls in the pan is to be drawn off. A basket is to be made of such dimensions as to stand on the top of the pan, and when placed there, to leave sufficient room, for the top to shut down; this basket is to be constructed to hold from one, to one and a half pecks of ice. It is found that this quantity will keep all articles put into the Refrigerator perfectly cool for twenty-four hours, and in that space of time, not more than one half the ice will be found to melt. It is proper however, to fill up the basket every morning. All articles to be cooled, are to be placed under, and on the shelves and the spaces between them, and the ice basket, and pan, except such as would not be injured by moisture; these articles, such as spirit, wine, water, milk, &c. must be put into bottles or pitchers, and may be set in the ice pan, round the basket. It will be found that every article placed in this refrigerator, will be precisely as cold as those in the ice pan; for in an hour after it shut the temperature is equal throughout. Upon this principle may be constructed ice-houses, ice-carts for transporting ice, butter, fowls, fish, and fresh meat; also for market-boats, and steam-boats, and refrigerators for mineral waters, large taverns, for the use of the bar, securing and keeping sweet, cold meats, and every other article taken from the table.

Patented, March 13, 1813.

SHIP'S GUAGE.

BY DR. ALEXANDER M'WILLIAMS, OF WASHINGTON, D. C.

The following Report was ordered, by the "Columbian Institute," to be published in the National Intelligencer, Washington Gazette, and Washington Quarterly Magazine.

THE committee to whom was referred the invention of DR. M'WILLIAMS, called the "*Ship's Guage*" beg leave to report:

That, before they proceed to the investigation, they think it may not be improper to mention the few inventions or machines that have been in use or can bear any affinity to the Ship's Guage.

1st. *Perkins's machine.*—This instrument has no connection with hydrostatic principles: it will merely shew the degree that a ship will deviate from a horizontal line, either athwart ship or fore and aft; but, there are no means of ascertaining from it how much a ship will settle in the water.

2d. *Bayly's Tide Guage.*—This instrument is the invention of one of Captain Cook's scientific companions, who accompanied him in the Resolution and Adventure from 1772 to 1775, and was intended to find the height of the tides in the Pacific Ocean. It consists of a glass tube whose internal diameter was seven-tenths of an inch, lashed fast to a ten feet fir rod divided into feet, inches, and quarters: this rod was fastened to a strong post fixed upright and firm in the water. At the lower end of the tube was a very small aperture, through which water was admitted. In consequence of this construction the surface of the water in the tube was so little affected by the agitation of the sea, that its height was not altered one-tenth of an inch, when the swell of the sea was two feet; and Mr. Bayly was certain that with this instrument he could discern a difference of one-tenth of an inch in the height of the tide.

3d. The "*Differenciometer.*"—This instrument has been for several years, and continues, in general use in the French navy. It is made of a leaden or tin tube one or two inches diameter, let into a perforation in the side of the ship, a few inches below the water line of light-water mark; thence running horizontally to the centre of the ship and joined to a perpendicular tube of the same dimensions; attached to the uppermost end of this last tube is a scale divided into feet, inches, &c. a float with an index is placed in this tube, which indicates the ship's draught of water on the scale.

Though this instrument is highly advantageous in port or still water, yet there are two circumstances connected with its construction that render it totally useless at sea. The first is, that the diameters of its aperture, in the side of the ship, or external opening, and both the horizontal and perpendicular tubes, are of uniform dimensions: the second, having the external opening at the side of the ship. The consequences resulting from the former is, that so long as the ship is in motion, the water in the perpendicular tube will be continually rising or falling with its motion; and from the latter, that whenever the vessel heels to the opposite side

of the aperture, it will necessarily be raised out of the water and the index be considerably elevated; and when heeling on the side of the aperture, the index will be as much depressed. In either case, or in combination, it is plain that the index can never be so stationary as to fix, with any degree of precision, the point on the scale denoting the ship's *true draught of water.* This is proven by the fact that the differenciometer is never made use of at *sea*, for the admission of water into the instrument is either then stopped, or it is taken down and removed to a place of safety.

4th. *Head's Machine.* In the 35th volume, page 256, of the "Repertory of Arts," there is a notification of a patent having been issued by the British government, in the following words: "James Head, Esq. of Lower Brook street, Grosvenor square, Middlesex, for a machine, or instrument, for ascertaining the difference of ship's draught of water, forward and aft, at sea or in harbour, dated July 27th, 1819." The succeeding volumes of that work, as well as many other scientific periodical publications to a late date, have in vain been strictly examined to find the specification or description of this patent.* It is thence presumed, that as the specification is not in any of the succeeding numbers of the Repertory of Arts, or any other journal, in which it is customary to publish every invention of utility, that it is of little or no importance. Could an idea be entertained that Head's instrument and the ship's gauge are one and the same, we have it in our power to shew, that the priority of discovery is due to our worthy fellow-citizen, as will appear by certificates from gentlemen of respectability in this city. It is likewise improbable that two individuals, living in different hemispheres, could invent machines for a particular object, that would have their relative, form, proportion, and principles, precisely the same. In consequence of being unable to find a description of this machine, which, from the tenor of its notification, appears so allied to the ship's guage, our consul in London has been written to, and requested to furnish a description of that patent, which, as soon as it is received, will be laid before the Institute.

The instrument that claims the attention of your committee, is called the "ship's guage," and is an invention of Dr. Alexander M'Williams, of this city. How far it may meet the expectations of the inventor, will be best shown by a description and a few remarks.

The ship's guage is a continued metallic tube, or cylinder, of different internal diameters, placed perpendicular to the keel. The smallest tube, having the diameter of one-tenth, or one-eighth, of an inch, passing perpendicularly through the keel, and connected by an inverted cone, to the second, of a larger diameter, of about one or one and a half inches; the length, or height, of the second tube terminates at the point equal in height to the *lower water line*, or light water mark of the ship, where it is also connected by another inverted cone to the third, of a

* Among them are, the Repertory of Arts, to March, 1823; Tilloch's Magazine, to February, 1823; Transactions of the Royal Philosophical Society, to December, 1822; and the Monthly Magazine, by Sir Richard Phillips, to February 1823—all inclusive.

still larger diameter. This third tube is called the reservoir, having a diameter of from four to six inches, the length or height from the lower water line to twelve or fifteen inches above the *load water line*; it may, if necessary, be continued much higher. On the top of the reservoir a cap is fitted, having a small perforation through its centre, to admit and to steady the index wire, which passes through it; there is, also, attached to the cap a scale of the length of the reservoir, divided into feet, inches, and eighths, or tenths of an inch. A brass or copper hollow globe of nearly the diameter of the reservoir, having a thick wire firmly secured to it, whose length will reach, when the globe is placed at the bottom of the reservoir, to the lowest point on the scale, where an index is fitted, this instrument is placed in the reservoir. The division of the scale is easily made by ascertaining in port or still water the precise draught of the vessel; the height of the index on the scale is then marked, which will be the point to lay off, by a common rule, the rest of the scale into feet, inches, &c. The object of connecting the tubes by inverted cones is to facilitate the removal of any obstructions that may be collected in the smaller tube by means of a linked wire, of nearly the thickness of that tube's diameter. To discover the exact line of inclination the keel bears with the horizon, it will always be necessary to have two guages on board, the one forward and the other aft.

The operation, then, from a thorough examination of the instrument, and the preceding description, appears to be, that water is admitted through the small aperture at the bottom, which ascends; and as all fluids will find their own level, very gradually reaches the level in the reservoir; the globe floats and is elevated as the water slowly rises; when it ceases to rise, the index will denote on the scale the ship's *true draught of water*. It is also evident, from its construction, by having the external aperture at the bottom so minute, in comparison to the diameter of the reservoir, that the ingress and egress of water during the motion of a ship at sea, even in a gale of wind, can, but in a very small degree, if at all, affect the rising or falling of the index. There can, however, be no doubt, that when a ship should roll so far as to make her mast incline to an angle below the forty-fifth degree from the horizon, that the index will, while she is in that position, be erroneous; which is more to be attributed to the inclination of the water in the reservoir preserving its then level, than to any quantum or deficit of water passed through the smaller tube: this effect, however, will be but temporary, and no longer than the ship continues under that angle; and indeed, when a ship is in that situation, the *trim*, as respects the draught, is the least thought that engages the attention of seamen. With this exception, your committee believe, that the level of the water in the reservoir will always be equal in height to the *line of floatation* of the ship; that the ship's guage combines all the advantages of the French differenciometer with none of its disadvantages; and that the principle of Bayly's tide guage is rendered perfectly applicable to the purposes of navigation. They also believe it to be an original invention of considerable usefulness and well adapted to the important purposes for which it was designed; and at the same time they cannot but concur in opinion with

the inventor, respecting its utility, as described by him, viz: "By it "every commander in his cabin can, at any time, and in any situation, "know the trim and draught of water of his ship, in port or at sea, in "calm or in rough weather, before or on a wind; if head sail be made, "how much she buries can be determined, and what difference after-"sail will make: In stowing a ship, or removing any articles from "whence to take them, or where to stow them, can also be determined. "Should the ship spring a leak, how much and how fast she settles in "the water can be ascertained: it will also tell if the pumps gain on the "leak, and *vice versa*, and how much: if the trim be lost no difficulty "will attend in immediately recovering it, and in a most perfect man-"ner: if a shoal is to be passed, and the depth of water on it being "known, the ship may be lightened to pass it by this guage. This in-"strument is extremely simple, and the expense inconsiderable: it will "occupy but little room, and if injured, may, at any time, be repaired."

In concluding, your committee beg leave to remark, that the subject of the "*trim of a ship*," (as applicable to her posture, proportion of ballast, arrangement of sails, aud position of masts for sailing,) and the difficulty attending a restoration of it when lost at sea, as all have a direct influence on the line of inclination the keel presents to the horizon, have not been stated in this report, because it is a subject well known to those whom this instrument is intended to benefit, and by whom its usefulness will be best understood.

J. A. BRERETON,
BENJAMIN HOMANS,
E. CUTBUSH,
B. WASHINGTON.

Washington, June 7, 1823.

(See Plate at the end.)

OBSERVATIONS ON THE VINOUS FERMENTATION;

With a Description of an Apparatus for the Improvement of the Process, according to the method invented by MADAME GERVAIS.

[FROM THE LONDON PHILOSOPHICAL MAGAZINE, FOR JANUARY, 1823.]

THERE is scarcely a single production of the earth, which, when appropriated to the use of man, is not so molified or changed by various preparations, as to possess a different property from that it contained in its primitive state.

Fruit and grain undergo decomposition, and a new recomposition, before he uses them as food; and until he applied art to the juice of the grapes, they were suffered to decay on the vines; but the ingenuity of man has converted them into a pleasant, wholesome, and lasting beverage.

In those climates where the only substitute for wine were milk or water, the inhabitants are indebted to this invention for malt liquor, a beverage which, though inferior to wine, is not destitute of some of those qualities that render it so great a desideratum.

The process by which these new properties are produced, is termed the vinous fermentation; it might, perhaps, with more propriety by called the alcoholic or spirituous fermentation, since it is a process by means of which all saccharine matters, whether they proceed from grapes, sugar-cane, or malt, are decomposed and recombined to form alcohol. But however wrong this denomination may be, we shall make use of it in the following observations, as being well understood by all classes.

A vinous fermentation, to be perfect, requires very exact proportions of mucilage and saccharine matter, so as to have the one just sufficient to destroy or attenuate the other; in which case the result would be, if the operation had been properly conducted, a mixture of alcohol and water, differently flavoured according to the materials from which it was produced, as grapes, pears, apples, or malt and hops; but such accuracy in the proportions cannot be expected, either from nature working at large, and varying in every climate, soil, and situation; or from short-sighted man acting mechanically, and frequently in ignorance of what he is doing.

A perfect fermentation, therefore, has been considered an object almost impossible to be obtained; and all we wish to show is, that the errors of the mixture may be corrected, and the whole process improved, by good management.

The common practice, until a few years back, has been to ferment in open vesssels; aud though it was a circumstance well known among chemists, that a certain portion of spirit and flavour escaped in the form of vapour during the process, yet no one had an idea that the condensatory system could be applied; as it appeared impossible to to effect the fermentation in air-tight vessels, being unable to surmount the great difficulty which existed, of keeping down and managing that enormous bulk of non-condensable gases, which are emitted during the the decomposition of the saccharine matter, and which acquire greater expansive force by the gradual increase of heat.

The idea, however, occured to Madame Gervais, a proprietor of considerable vineyards near Montpellier, who has founded a system on the following principle: that what is termed the vinous fermentation, is a mild, calm, and natural distillation; which, according to the usual acceptation of the word, has proved a correct system, since not a single drop of spirit is formed before it commences, nor after it is over. Having first laid down this ground-work, she proceeded to obtain an apparatus that would operate in such manner as to return into the vessel the spirit and flavour that was evolved from the fermenting gyle, and let out the non-condensable gases, which might, by the increasing heat, acquire too great an expansive force, and burst the working-tun: a short description of this apparatus will be a fresh proof that the greatest advantages are often derived from the most simple means.

It consists of a vessel resembling the head of the ancient still, and constructed of such form as to be capable of being placed securely on the back, or vat, in which the process of fermentation is to be carried on; the back or vat must be closed air-tight, with a hole in the top,

communicating with that part of the apparatus called the cone or condensor. This cone is surrounded by a cylinder or reservoir, which is to be filled with cold water, so that the alcoholic vapour or steam, evolved during the process, may be condensed as it comes in contact with the cold interior surface of the cone; and being thereby converted into liquid, trickles down the inside of the condenser, and through a long pipe is returned into the fermenting liquor.

By the application of this apparatus, a considerable portion of alcohol, which has been hitherto suffered to escape in the form of vapour, along with the non-condensable gases, is condensed and returned into the liquor; and the non-condensable gases are carried off by a pipe, which, proceeding from the interior lower part of the cone, and running up the inside of the cylinder in the cold water, passes out through the side, and the end is immersed some depth below the surface of water contained in a separate vessel, permitting the gases to escape, but still under a certain degree of pressure, the object of which is, to confine the alcoholic steam and gas within the cone, and allow them a sufficient time to cool and condense.

To persons in the least acquainted with chemical operations, it would be useless to dwell on the merits of this apparatus; they will at once see how beneficial it would prove to any liquid that has to undergo the vinous fermentation in any stage of its manufacture; but to those who are not so conversant in the principles and causes of these operations, they will require to be pointed out.

To obtain a good fermentation, as complete a decomposition of the must or wort, and as perfect a recomposition of alcohol as posible, are the great objects to be ohtained. To acquire the former, three requisites are necessary; fluidity, heat, and motion. The latter; density, coolness, and tranquillity.

Let us examine each of these separately; first, of fluidity.

The specific gravity of the liquid, most eligible to produce a good fermentation, is between 1.020 and 1.140, or eighteen; and one hundred and thirty-two pounds by Dicas's improved saccharometer, made by Joseph Long, No. 20, Little Tower-street, London. Below eighteen pounds of real extract per barrel, the liquid is too thin to produce a proper fermentation, and above one hundred and thirty-two pounds it is too thick; but supposing the specific gravity of the must or wort to be correct, it may be carried beyond a proper dilitation by too much heat, or congealed to too great a consistency by excessive cold; consequently either a thunder-storm or hard frost will derange the operation, and are equally injurious to fermentation. Any method, therefore, that will ensure an even temperature must be of great importance; and such a method is obtained by applying the apparatus already described, since, by preventing the access of atmospheric air, the sudden changes of the external temperature can have no effect opon the fermenting gyle; and if it has been PITCHED at a proper heat, (which is between sixty-five and eighty,*) will proceed through its different stages, as well during

* Fermentation will take place from forty-eight to one hundred and thirty-eight degrees.

the hottest days of summer, as in the selected months of autumn and spring.

With respect to motion, we are indebted to Monsieur Gay-Lussac, an able French chemist, for a beautiful and important experiment, proving that must, possessed of all the requisites to produce a good fermentation, will not begin to ferment unless excited by a foreign agent. He placed the must in a close vessel, from which the atmospheric air had been exhausted, where it remained several days without giving any signs of fermentation, from which he concluded some power was wanting to break the union of its constituent principles; he therefore introduced a small quantity of oxygen, which immediately caused the must to ferment, evidently proving the necessity of a small portion of atmospheric air (which contains oxygen), to allow the fermentation to commence. But it at the same time proves, that, after performing that office, this great enemy to all fermented liquors may be dispensed with, without impeding the process; as the small quantity of oxygen, introduced by Monsieur Gay-Lussac, was soon absorbed by the carbon to form carbonic acid gas, and he found no occasion for any further supply.

This discovery is of the greatest importance, since it enables us, without the least detriment or inconvenience to the process, to exclude the oxygen of the atmospheric air, which, by constantly supplying the gyle with the principle that causes and promotes acidity, casts on it from the first that roughness and disagreeable flavour which spoil most of our common beverages.

Here again the new apparatus proves of great benefit; for as soon as carbonic acid gas is evolved from the fermenting gyle, the atmospheric air, being lighter, is driven out from the upper part of the working-tun; and as no air is permitted to enter afterwards, all the subsequent carbonic acid gas emitted diminishes the quantity of oxygen contained in the gyle, by the oxygen uniting with the carbon as fast as it disunites from the saccharine matter during its decomposition, and thereby secures a soundness and peculiar mildness not to be procured by any other mode.

The necessary conditions for a complete decomposition of the saccharine matter having been stated, it remains to notice those required for a good production of alcohol.

The first already mentioned is a certain density, in order to allow the several principles which are disunited to recombine. It is doubtful whether such a combination will in any case take place, until the temperature of the gyle, having attained its greatest heat, is afterwards cooled a few degrees; a fact confirming which is, that a portion of the liquid taken out when at its greatest heat, and tried by distillation, produced little or no spirit: but such refrigeration must not be effected too suddenly, as it might coagulate the yet undecomposed mucilage, and check its further action on the remaining saccharine matter; and by arresting that natural operation which ought to be pursued a longer or shorter period, according to the specific gravity of the fermentable matter, might produce that result termed ROPINESS, by holding in solution the coagulated mucilage.

Here again the apparatus will be found of great service; for, by frequently renewing the cold water in its reservoir, the internal temperature will gradually diminish by the heat of the gyle coming in contact with the cold interior of the cone: but in order to effect this, the tranquillity above mentioned is necessary, since the continual motion is caused by the oxygen soliciting new combinations with the carbon, and thereby constantly giving rise to a fresh supply of heat.

Besides the advantages already mentioned, which are common to all fermented liquors, there are others peculiar to each, that require to be explained.

The apparatus being applied to ferment the must of grapes, has been found to procure an increase of quantity, amounting in some instances to ten or twelve per cent. and which necessarily varies according to situation, season, or former management; but in no instance has it been found less than from five to six per cent.

When applied to the fermentation of beer, this saving has constantly been between four and a half and five per cent. a quantity certainly inferior to that obtained from wine, but which will not appear unimportant when it is considered that this saving is a spirit congenial to the nature of the beer, and an essential oil necessary to its preservation; in addition to the peculiar mildness and superior flavour. It remains now to mention the principal objections which have hitherto been offered against a general adoption of the system, and application of the apparatus to the fermentation of beer; as it cannot be expected that any persons should relinquish those plans they have been accustomed to consider right, or incur fresh expenses, without being fully convinced of the advantages to be derived from them.

The first objection raised against the system was in consequence of the whole process being performed in the same vessel, as fears were entertained of the beer being YEST-BITTEN: but the first experiment soon dispelled all doubts respecting that event, as the beer was tasted by at least fifty of the best judges in London, and pronounced not to be in the least affected by the yest, which has been fully proved by every succeeding experiment: and if we examine that question more attentively, we shall find beer is never kept in any vessel, whether working-tun, cleansing-casks, or keeping-vats, without being in contact with yest: therefore, if it were to communicate any unpleasant or bitter taste by long contact, it would do the same equally on the old system as on the new. But yest does not impart a bad flavour, unless it has contracted it by long exposure to the atmospheric air; which can never be the case with the apparatus, since, as there are no DRAWINGS OFF, neither the yest nor beer comes in contact with the atmosphere.

Another objection was, that the yest, by so protracted a fermentation, must be spent, and incapable of producing a second fermentation. If such were the case, brewers, by adopting the new system would be left in a most awkward situation, since eight or ten days would be the longest period they could continue their operations. But Lavoisier, in an experiment on fermentation, found that only one seventy-second part of a pound of yest had been destroyed in fermenting five hundred pounds

of wort. Besides, experience teaches us that yest does not lose its power by remaining long in the beer; for when a barrel of beer is moved, that has remained stationary six months or a year, a fresh fermentation takes place, and more particularly if the temperature is at a certain degree of heat. However, as the objection was made by one of the great brewers in London, it became incumbent to refute in it by immediate experiment. The yest made use of on that occasion proceeded from pale ale, fermented under the apparatus fifteen days, and was kept eight days; it had not indeed, so quick an effect as the other yest had, tried at the same time, which was only kept one day, and proceeded from porter brewed according to the old plan, as the latter began to move about two hours after it was SET, and the former did not act until ten hours later; but they both produced an equally good fermentation.

The brewer who attended this experiment, a man of great experience, attributed the slowness of its action to its proceeding from pale ale, and more particularly to having been kept so long; at the same time admitting, he never would himself use yest of such an age. However, another experiment was made, in order to ascertain if that was the real cause; it was tried at Messrs. Gray and Dacre's brewery, and found to be perfectly correct; for yest from table beer, which had been fermenting under the apparatus eight days, even after it was kept three days, produced a perfectly good fermentation.

Some brewers have objected to the length of time it requires to ferment in close vessels; but although the process appears to proceed slower in them than in open ones, yet the beer is brought much earlier to perfection; for with respect to strong beers, as porter or ale, they are as far attenuated, and as fit to drink, six weeks after they are brewed, as any fermented in the general way after three months.

With respect to table beer, from fifteen to twenty days are thought requisite to bring it into perfect condition; but it is said the table beer brewers will exclaim against a three weeks' fermentation, since forty-eight hours is a sufficient time by the present mode, their object being a quick return: still it can hardly be supposed they are serious in their exclamations, from the known impossibilty of accomplishing any fermentation in that period.

The operations of nature are neither violent nor precipitate, but gentle and slow: if urged by too great a desire to obtain quick returns, imperfect and bad results will be produced, and they are to be obtained much more easily without than with the apparatus. A boiled solution of hops in unfermented wort does not constitute beer; the one produces drowsiness, and disorders the stomach, whilst the other, on the contrary, exhilirates the spirits, and promotes digestion.

Having so far endeavoured to point out the use and advantages of the new system to the brewers, we shall venture to explain to the distillers and vinegar-makers the benefits they may derive from the same process.

The chief object of these manufacturers, during the vinous fermentation, is to arrive in the shortest time at as complete a decomposition of the saccharine matter and production of the alcohol as possible, since upon these depend the strength and quality of the product. The way

to effect this is by HIGH FERMENTATIONS; but if there is access for atmospheric air when the wash is in that high state of dilatation, it will rush in and furnish the batch with fresh oxygen, and thereby accelerate one portion of the wash into the acid fermentation before the whole of the alcohol has had time to combine; so that distillers and vinegar-makers are obliged either to stop the process before it is complete, or to suffer a certain portion of alcohol to be destroyed by the commencement of the acid fermentation: in both of which cases their loss is unavoidable. The apparatus will not only prevent this, but condense a certain portion of spirit, as in every other case of the vinous fermentation.

The wine and cyder-makers may cherish the hope of improving their manufacture by the same method, so as to make it superior to many of the foreign wines; cyder and perry in particular are capable of being greatly benefitted by it, as an experiment which we have made upon the former leaves us no room to doubt of the great advantages to be derived from the application of the apparatus.

Apples, and indeed almost every fruit, contain the principle of a very pungent acid, called the malic acid, This, when the oxygen of the atmospheric air is allowed to combine with it, produces a roughness, which is often so predominant in cyder as to cause it to be scarcely drinkable; but all access of the atmospheric air being precluded during its fermentation, cyder becomes a mild and pleasant beverage. The same will, doubtless, be the case with perry, which, when perfect, will bear as near a resemblance to champagne, as any two liquids produced from fruits so different in their external appearance can have. However, wine in its most perfect state, is the criterion of all fermented liquors; every imitation is rated according as it more or less possesses the same properties. The characteristic qualities of wine are alcohol and flavour; the one may be obtained from any vegetable substance containing saccharine matter and mucilage, and is the principle of strength and durability. We are not so well acquainted with the nature of the other, being of so volatile and subtle a disposition as to have hitherto baffled all analysis, and only to be detected by the most perfect sense of taste; and though some palates can discover its presence with tolerable accuracy, yet they are unequal to point out the means of increasing or improving it. We know some of the causes which occasion its escape, the principal of which is heat; every additional mixture of good, for the purpose of improving a bad flavoured liquor, any adulteration or disease, will equally destroy it; and it lies concealed until fermentation is nearly completed, when it is developed, and manifests itself as a last and crowning perfection.

This circumstance may have given rise to the opinion, that the principle of flavour is resinous, since it becomes more prevalent as alcohol (which is the best dissolvent of resin) becomes more predominant. Be this as it will, the apparatus may some day serve to ascertain the fact, since the spirit condensed by its means is strongly impregnated with that principle, and, if resinous, may be easily separated by simply mixing it with pure water; when the spirit, by having a greater affinity for the water, will disengage itself from, and allow the resin to precipitate.

To conclude: It may be observed that the most approved wine is not always produced from the best must, but frequently derives its superiority from fermentation and good management. In like manner will beer and other fermented liquors acquire their greatest perfection from the same source which, for that reason, ought to claim and engross the attention of every brewer, or other person engaged in the manufacture of fermented liquors.

The invention of Madame Gervais above described, is further stated to have engaged the attention of several of the most eminent chemists and enlightened men in France, where a company has been formed, consisting of the Duc of Bellune, Count Chaptal, Viscount Chaptal, Count Dullau Dallemans, Count de Brissac, Mons. Froidfond de Bellisle, Mons. Gaston Deurbroucq, &c. &c. who have purchased Madame Gervais' patent in order to propagate the utility of her improved method of fermentation; which, moreover, is already successfully practised at the considerable brewery of M. Chappellet in Paris.

A patent for the use of the apparatus in this country (England) has been obtained by Messrs. Deurbroucq and Nichols; and it has been tried with such complete success by Messrs. Gray and Dacre of Westham in the county of Essex, that they have adopted the system, and are now, as far as the alteration to be made in their working-tuns will permit, fermenting on no other plan.

(See Plate at the end of this number.)

DOUBLE LOCK FOR CANALS,

As now in use on the Regent's Canal, near London.

The following article, with the plate to illustrate it, is the one we have referred to in our observations on the Extract from the Report of the commissioners respecting the Potomac Canal. If ever that stupendous undertaking should be completed by carrying the water communication quite across the mountains, this is a plan of immense importance on the higher levels. *(See the Plate at the end of this number.)*

[FROM TILLOCH'S PHILOSOPHICAL MAGAZINE.]

The plan of a double lock, whereby *twice* the facility of transit is obtained, with only *half* the expenditure of water.

Example. A and B (Plate) are locks having a communication by means of the sluices W. and *x* in the middle pier. Now admitting lock A shall be full, and lock B empty, at the same time that two barges shall arrive, the one going down, and the other up the stream; the barge going down will naturally enter the lock A which is ready for her reception; while the other will enter B. The sluices and gates being now shut, let the middle pier sluices be opened, so that the water may flow from lock A into B (view the transverse section,) whereby the barge in A will be lowered, and the barge in B raised, till both are on a level;

at which time the barge in A will be half up, and the barge in B half down. Now shut the pier sluices W and *x*, and open the side sluices *y* and *z*, whereby lock A will continue to empty and B to fill, till the water in each obtain the level of the lower and upper canal: the gates C and D being then opened, each barge is at liberty to depart, the one up and the other down the stream; the time employed to pass them being no more than the time employed in passing *one* barge through a single lock; and to perform this double duty, only *one* full lock of water has been withdrawn from the upper level of the canal.

A STORY FOR THE LADIES.

THE editor having requested a friend, in his absence, to superintend the revision of two or three half sheets of this number; upon his return was greeted with this very comfortable and encouraging observation. "What an absurd and stupid book, you are preparing to add to the unsaleable loads in our book-sellers' stores! Who do you think will waste their time in reading about canals and steam-engines and patent-rights? Besides, you have not a single lively story to interest the ladies, and therefore cut yourself off from one half of your would-be-customers at a stroke." Now, plague on this republicanism, said I to myself, one can find nothing showy, fine and entertaining, without going to Europe for it. While we are working, toiling, cutting and contriving how to get along, and forever poring upon what may be useful and valuable to the next generation; all these things are left to superior direction on the other side of the water; and a thousand raree-shows, and exciting incidents, keep the pleasures of the populace alive. However, as ardent spirits do less harm to the drinker when diluted with water, perhaps we have some advantages in only hearing at a distance the noise of that mirth and pageantry which has an inebriating effect on the immediate actors and spectators.

Accept, ladies, the following extract from a very entertaining novel entitled the STEAM-BOAT, lately imported. It is written by the author of the admired *Annals of the Parish*, and in the Scottish dialect. Our extract is a humorous account of a part of the Coronation of George the Fourth.

THE CORONATION.

When the Doctor had made an end of this edifying account of our Scottish national way of crowning the Kings in times past, I turned round to Mrs. Pringle, who was sitting at my right hand, sucking an oranger, with her satin gown kilted up to save it from the accidental drops of the juice, and inquired at her what was her opinion of the crowning in the Abbey.

"Mr. Duffle" said she, "I have got no gude o't; for the Doctor, at every new o'ercome o' ceremony, panted with an apprehension; and when he saw the 'nointing, I was in a terrification that he would speak

loud out, and get us both sent to the Tower of London for high treason. But Mr. Duffle, do ye ken the freet of yon doing wi' the oil on the palms of the hand? It's my opinion that it's an ancient charm to keep the new King in the kingdom; for there is no surer way to make a new cat stay at hame, than to creesh her paws in like manner.—as we had an experience of, after our flitting from the Manse to Hydrabad-house, as we call our new place, in the memory of the Cornal's legacy; for Miss Mally Glencairn made us a present of one of Miss Nanny Pedian's black kittlings, which is a radical sorrow, like Miss Nanny's own hardware self,—thieving baith in pantry and parlour, when it can get in. Howsomever, Mr. Duffle, this business must have cost a power of money; and considering the King's great straits, and the debt that he and his ministers owe to the pesents, out of which, I do assure you, we were glad to get our twa three pounds, for they were never twa days the same,—it must be allowed that it is a piece of dreadful extravagance. But the Lord Londonderry, that was the Lord Castlereagh, is surely a genteel man—none more so among all the Lords—and I would fain hope he knows where the money is to be had to pay the expense. There he is yonder—that's him with the grand cap of white feathers, and the blue velvet cloak, to denote that he's in the King's servitude.—I hope he's no ordained to be one of the auld blue-gowns. See what a fine band of diamonds he has on his cap. A gentleman told me they were pickit out of the lids of the snuff-boxes that he and his lady got from the Emperor Alexander and the King of France, for putting Boney out of the way, that was sic a potentate to them all. But, Mr. Duffle, how is it possible for sic a stack of duds as the King is, to fight in state at the head of his armies, when required, for his crown and kingdom? Howsomever, I spose, as by law now-a-days he is not allowt to go to the wars, the parliament winks at him. But can ye think, Mr. Duffle, that it's possible all the diamonds on the leddies' heads here are precious stones? The King's crown, I am told, is sprit new, gotten for the occasion, as the old one was found, on an examine, to hae mony false jewels put in to delude the people, the true ones being purloined in times o' trouble. But now that the Coronation's 'played and done,' can you tell me, Mr. Duffle, what's the use o't; for I hae been sitting in a consternation, trying to guess the meaning of a' this going out, and up and doon, and changing swords, and helping the King off and on wi' his clothes—'first wi' his stockings and syne wi' his shoon,' as the sang of Logan Water sings.—It may be what the Doctor calls a haryglyphical ceremony, but haryglyphical or rabbitifical, I doubt it would take wiser men than Pharaoh's or the Babylonian soothsayers to expound it. To be sure it's a fine show, that cannot be denied; but it would have been a more satisfaction to the people had his Majesty paraded up and down the streets like your king Crispianus at Glasgow."

While Mrs. Pringle was thus discoursing, in her descanting way, in high satisfaction and glee, taking every now and then a suck of her oranger, the Head Lord Chamberlain came with his staff in his hand, arrayed in his robes of crimson-velvet, and wearing his coronet on his

head, and ordered the hall to be cleared, turning out by his own bodily command, every one that lingered on the floor, more particularly the Earl Marshal's flunkies; for it seems that the Lord Chamberlain, as I read in my old Magazine, is obligated, at a royal Coronation, to have a gaw in the Earl's back, and takes this method to show his power and supremacy within the bounds of the Hall. But the ceremony was, I could see, not relished by those in the Earl Marshal's livery, for the most part of them, being gentlemen disguised for the occasion, had hoped, under that masquerading, to have egress and ingress both to Hall and Abbey. However, the disgrace was inflicted in a very genteel manner, by the Lord Gwydir, who performed the part of Lord Chamberlain, throughout the whole ploy, with the greatest ability. Nothing, indeed, of the kind, was ever so well done before; for his lordship, unlike his corrupt predecessors, making a profit of the office, did all in his power to render it suitable to the nobility of the three kingdoms, and suppressed the sordid custom of making the royal ancient feast of the King of the realm a pay show, like the wax-work of Solomon in all his glory.

When the Hall was cleared in this manner, a bustle about the throne announced that the King was again coming, so we all stood up, and the trumpets sounding, in came his Majesty, with his orbs and sceptres, and took his seat again at the table. Then the lower doors were thrown open, and in rode three noble peers on horseback, followed by a retinue of servitors on foot, bearing golden tureens and dishes, which, after some palaver, were placed on the King's table. During this scene, the learned gentlemen of the daily press, above and behind me, were busily writing, which Dr. Pringle observing, inquired what they were doing; and when I explained it to him, as I had been told, he noted that the ambassadors of the allied powers were placed over against them, and said, that the thing put him in mind of Belshazzar's feast, the newspaper reporters being to them as the hand-writing on the wall. "MENE, MENE, TEKEL UPHARSIN," said the Doctor, in so solemn a manner, that I wished the ambassadors could have heard it, as it might have been to them for a warning to their masters; no doubt, however, they were dismayed enough to see the liberty of the press so far ben, and for the first time, too, in a station of recognised honour at a Coronation.

When the golden dishes were set before the King, they stood sometime untouched, for his Majesty would not permit them to be uncovered, till one of the ministers was got to say the grace. Then the lids were taken off, when, lo and behold! as Mrs. Pringle judiciously observed, they contained but commonalties; and surely, as she said, there ought to have been, at least, one pie of singing blackbirds, on such a great occasion. However, the King tasted but little of them; it was therefore supposed that he had got a refreshment behind the scenes. But we know not the truth of this suppose; and, at the time, I could not but compassionate his Majesty in being obligated to eat before such a multitude. It would have spoiled my dinner, and the thought of such discomfort made Dr. Pringle, as he told me himself, pray inwardly that the Lord might never make him a king; a very needless prayer, in my

opinion, considering the reverend Doctor's great simplicity of parts and talents in the way of policy.

At this time, I discerned a very clever and genteel manner of acting on the part of the Lord Londonderry, who was one of the grandest sights in the show. In marching up the Hall with the rest he took, his stance on the platform whereon the throne was placed, and in the wonderment of the time forgot to take off his cap of feathers, although then before the presence of the King's Majesty. Some friend at his Lordship's elbow observing this, gave him a jog, to put him in mind that it might be thought ill breeding. Any common body like me would have been sorely put out at committing such an oversight; but his Lordship, with great ready wit, showing what a pawky diplomatic he is, instead of taking off his cap on the spot, feigned to have some turn to do on the other side of the platform; so he walked past in front of the King, and making his Majesty as beautiful a bow as any gentlemen could well do, took off his cap, and held it for the remainder of the time, in his hand.

The first part of the banquet being ended, the sound of an encouraging trumpet was heard— and in came the Champion on horseback, in the warlike apparel of polished armour, having on his right hand the Duke of Wellington, and on his left the Deputy of the Earl Marshall. But it does not accord with the humility of my private pen to expiate on such high concerns of chivalry; and I was besides just torment the whole time by Mrs. Pringle, speering the meaning of every thing, and demonstrating her surprise, that the Duke of Wellington could submit to act such a play-actor's part. Really it's a great vexation to have to do with either men or women of such unicorn minds as Mrs. Pringle, where there is any thing of a complexity of sense, as there is in that type and image of the old contentious times of the monarchy, shown forth in the resurrection of a champion in a coat-of-mail, challenging to single combat.

In this conjuncture of the ploy, we were put to a dreadful amazement, by a lady of an Irish stock, as I heard, taking it into her head to be most awfully terrified at the sight of a Highland gentleman in his kilt, and holding his pistol in his hand. The gentleman was Glengarry, than whom, as is well known, there is not, now-a-days, a chieftain of a more truly Highland spirit; indeed it may be almost said of him, as I have read in a book, it was said of one Brutus, the ancient Roman, that he is one of the last of the chieftains, none caring more for the hardy mountain race, or encouraging, by his example, the love of the hill and heather. Well, what does the terrified madam do, but set up a plastic to disarm Glengarry, thinking that he was going to shoot the King, and put to death all the blood-royal of the Guelf family, making a clean job o't for the bringing in of the Stuarts again. Then she called to her a Knight of the Bath, and a young man of slender nature, one of the servitors, and bade them arrest Glengarry. It was well for them all that the Macdonell knew something of courts, and the dues of pedigree, and bridled himself at this hobbleshow; but it was just a picture, and a contrast to be held in remembrance, to see the proud and bold son of the mountain—the noble that a King cannot make, for it's past the monarch's power to be-

stow the honour of a chieftainship, even on the Duke of Wellington, as all true Highlanders well know;—I say, it was a show to see him, the lion of the rock, submitting himself calmly as a lamb to those "silken sons of little men," and the whole tot of the treason proving but a lady's hysteric.

After the champion and his companions had made their "exeunt omnes," as it is written in the Latin tongue, in the play-books, there was another coming forth of the high Lords on horseback, followed by their retinue of poor Gentlemen, that have pensions, carrying up the gold dishes for his Majesty's table, in a most humiliated manner, bowing their heads three times, and coming away backward; and when the King had eaten of the dishes, there was a great show of royalty and regality performed by divers dukes and lords of manors; among others, I was pleased to see his Grace of Argyle performing the ancient part of his Scottish progenitors, and getting a golden cup for his pains.

I think it was in this crisis of the entertainment, that Mrs. Pringle pointed out to me, sitting by the head of the Peer's table, an elderly man, with a most comical wig, and having a coronet over it on his head, just a sport to see. Both the mistress and me wondered exceedingly what he could be, and when we heard him propose to drink the King's health, with one and eighty hurras, we concluded he could be no other than the King's George Buchannan on this occasion; and what confirmed us in this notion, was his soon after going up as one privileged, and saying something very funny to his Majesty, at which we could see his Majesty smiled like a diverted person. Over and above this, he took great liberties with his Royal Highness the Duke Clarence, at the King's left hand, shaking hands with him in a joke-fellow-like manner, and poking and kilting him in the ribs with his fore-finger, which was a familiarity that no man in his right mind at the time would have ventured to practise at the royal table, and before the representatives of all the monarchies of Europe, as were there assembled looking on. But when I pointed him out to the Doctor, the Doctor was terrified at our ignorance, and told us that it was the Lord Chancellor. I could not, however, believe this, as it is well known the Lord Chancellor is a most venerable character, and knows better how to behave himself with a gravity, when within the light and beam of the royal eye.

But the best part of the ploy was after his majesty had retired, for, when he departed, every one, according to immemorial privilege, ran to plunder the table, and the Doctor and me and Mrs. Pringle, made what haste we could to join the hobbleshow below, in order to get a share of the spoil. The Doctor, at the first attempt, got a golden cup, as he thought, but, och hon! honest man! on an examine it proved to be only timber guilt; as for me, I was content with a piece of a most excellent bacon ham, and a cordial glass or two of claret wine, and a bit seed-cake, having fasted for so long a period. Mrs. Pringle would fain have had a rug at the royal napery on the King's table, but it was nailed fast. She, however, siezed a gilded image of a lady, like what is on the bawbees, with a lion by her side, and not a little jocose the Mistress was with it, for it was almost as big as a bairn, wondering and mar-

velling how she would get it carried home. But, as the Doctor observed on the occasion, most uncertain are all earthly possessions. Mrs. Pringle happened just for a moment to turn her back on her idol, to take a glass of wine with me, when a bold dutchess-looking lady laid hands on the darling Dagon, and carried it away to another part of the table, where she sat down triumphing among judges and other great personages, and expatiated over her prize. Poor Mrs. Pringle was confounded, and turned up the white of her eyes like a dying doo, with disappointment, and had not the courage to demand back her property, being smitten with a sense, as she afterwards said, of not having come very honestly by it; so the lady carried off the image as her prize, to her chariot, and a proud woman I trow she was, demonstrating over its beauties to all her acquaintance, as she bore it along in her arms, and on her own great good luck in getting it.

As we were thus employed, Mrs. Pringle gave me a nodge on the elbow, and bade me look at an elderly man, about fifty, with a fair gray head, and something of the appearance of a gausey good-humoured country laird.—"Look at that gentleman," said she.—"Wha is't?" quo' I.—"That's the Author of Waverley," was her answer; "a most comical novel, that the Doctor read, and thought was a true history book."

After this we rose, and the disappointment of the golden image was not the only dejection that Mrs. Pringle was ordained to meet with that night. Both the Doctor and her had forgotten to make proper regulations about Captain Sabre's carriage, which was to take them home; so that, after waiting till the Hall was almost skailed, and many of the lights out, we three, in all our finery, were obligated to walk out into the streets, and no hackney was to be seen or heard of. What with the gravel hurting her feet, and the ruin it was of to her satin shoes, Mrs. Pringle was at the greeting; and some drops of rain beginning to fall, her new gown was in the very jaws of jeopardy. But she is a managing woman, and not often at a loss;—seeing the Doctor and me standing overcome with perplexity, and in a manner demented, she happened to observe a gentleman's carriage at a door, and, without more ado, she begged the servants to ask their master to allow them to take her home, which he very readily did, and thus extricated us all from a most unspeakable distress, for both the Doctor and me got into the chaise beside her, and arrived safe at Captain Sabre's, where there was a great assemblage of friends, and a wonderful speer and talk about what we had all seen that day at the Coronation.

When we had rested ourselves a short space of time, and taken some refreshment, the Doctor and me (he having put off his gown and bands,) went out by ourselves on our feet, it being no length of a walk from Baker-street to Hyde-Park, to see the fire-works, things which the Doctor had never seen, but which were no unco to me, as we have had sic-like at Glasgow, from riders and equestrian troops. But this, at that time of night, was not a very judicious adventure, considering that I was in my sky-blue court-dress, with a cockit-hat and a sword; for it brought the voices of the commonalty. I, however, could have

put up with them, but just as we got into the crowd, there was a great flight of sky-rockets, with a fearful rushing noise, which so terrified Dr. Pringle, that he thought it was a fiery judgment breaking out of the Heavens upon London, for the idolatries of the day—and uttered such a cry of fright, that every body around us roared and shouted with laughter and derision; insomuch, that we were glad to make the best of our way homeward. But our troubles did not then end. Before we were well out of the Park, an even-down thunder-plump came on, that not only drookit the Doctor to the skin, but made my sky-blue silk clothes cling like wax to my skin; and, in the race from the rain, the sword gaed in between my legs, and coupit me o'er in the glaur of the causey with such vehemence, that I thought my very een were dinted out; the knees of my silk breeks were riven in the fall. Some civil folk that saw my misfortune, helped me in with the Doctor to an entry mouth, till a hackney could be got to take me home. In short, the sufferings I met with are not to be related, and I had an experience of what it is to be stravaiguing after ferlies at the dead hour of the night; for when I reached Mrs. Damask's house, she was gone to bed, and no body to let me in, dripping wet as I was, but an ashypet lassie that helps her for a servant. No such neglect would have happened with Mrs. M'-Lecket in the Salt-market. She would have been up to see to me herself, and have had the kettle boiling, that I might get a tumbler of warm toddy after my fatigues. But I was needcessitated to speel into my bed as well as I could, shivering with the dread of having got my death of cold, or of being laid up as a betheral for life, with the rheumatics.

OBITUARIES, REMARKABLE OCCURRENCES, &c

Chronologically recorded, and arranged under the separate heads of the different States in this Union.

MAINE.

Died, in Ashburnham, on the twenty-seventh of April, the Rev. John Cushing, D. D. in the seventy-ninth year of his age, and fifty-fifth of his ministry. Dr. Cushing was exceedingly endeared to the people of his immediate charge, and to all who had the pleasure of his acquaintance, as a sound theologian and zealous philanthropist.

—000—

NEW HAMPSHIRE.

Death of Father Welch.

At Bow, on Saturday the fifth of March died the venerable Samuel Welch, the oldest person in New Hampshire, at the age of *one hundred and twelve years and seven months!* He was born at Kingston, N. H. Sept. 1, 1710, O. S. His grandfather, Philip Welch, was a native of England, and one of the first settlers at Ipswich, Mass. His father, Samuel Welch, settled early at Kingston, and lived to between eighty and ninety years of age. His mother lived nearly a century; a sister till about one hundred, and a brother till more than ninety years of age. Mr. Welch spent the early part of his life on the paternal farm; afterwards removed to Pembroke, purchased a small tract of land and settled upon it. About fifty years since, he removed to Bow, where he steadily cultivated his little farm, till the winter of age was gathering around him, and the infirmities of a second childhood warned him of his approaching dissolution. It was not, however, till a hundred summers had passed that he was compelled to abstain from labor. Mr. Welch had through life been a man of industry, and a lover of retirement. The dangers of Indian warfare had never disturbed him, though the savages for many years lurked in the vicinity. No accident or evil appears to have befallen him; his long life has been an even tenor of quiet industry and comfort, unmarked by those vicissitudes which distinguish the history of many of our aged people. The grand secret of his extraordinary health seems to have been his uniform temperance, which with a single exception, secured to him through life a sound constitution, and an entire exemption from disease.

Till within a very short time his mental powers were little impaired, and he could converse with freedom and propriety. With the years long passed he was most familiar, and would relate, with ease, circumstances that occurred half a century ago; while with recent events and the present race of men, he was little acquainted. For the last few years he has had many visitors—the young and thoughtless to behold the patriarch of a century and an eighth—the old, to commune with a man, to whom they appeared as youths.

His appearance was truly venerable. Time had made deep inroads upon his frame; his locks had been touched by the silvery wand; his eye, originally dark and brilliant, gave evidence of decaying lustre; while his countenance, wrinkled with years, and his frame, tottering and feeble, could not but deeply impress the beholder. He spoke of life as one weary of its burthens, and wishing "to be away." His death corresponded with his life—it was calm and tranquil. And we trust he has gone to taste the rewards of a life spent in quiet virtue and unambitious goodness.

Mr. Welch was the oldest native citizen of New Hampshire. Three, however, have died here at a greater age, viz. Mr. Lovewell, of Dunstable, (father to Colonel Zaccheus Lovewell, mentioned in Belknap's N. H. vol. ii, p. 233,) aged 120; William Perkins, of New Market, who died in 1732, aged 116; and Robert Macklin, of Wakefield; who died in 1789, aged 115. It may be mentioned, in favor of the general salubrity of our climate, that within a century about one hundred persons have lived in New Hampshire to the age of a century and upwards. We doubt whether any other state in the Union can present so many instances of longevity.

[*N. H. Patriot.*

—

In Groton, on the twentieth of April, the Rev. Cotton Haines, aged seventy-seven years; and, on the twenty-second, his widow Martha Haines, aged seventy-six years. They were born and married in Greenland, and they moved to Romney in the early settlement of said town, in

which place he was settled as a Baptist Minister over the Church, and he continued his gospel labors a number of years. Mr. Haines was a warm animated preacher, and manifested a profound regard for the doctrine of good works. His wife was a benevolent and good woman, kind to the poor, and an ornament to the church. They were blessed with twelve children, seventy-eight grand children, fifty-four great grand children, and one of the fifth generation, most of whom are now living.

—

FROM THE N. H. REPUBLICAN, OF MAY 28.

The first settlement of New Hampshire was commemorated on the 21st, at Portsmouth, in a style which does credit to the public spirit of its citizens.

Heaven seemed to smile propitiously on the occasion; for the weather was delightful, and a bright sun and a clear sky lent all their animation to the brilliant spectacle, and gave additional vivacity to a scene of unusual splendor and festivity.

We have not room to detail the festivities of the day, but are desirous of retaining the following patriotic effusion.

AN ODE,

Written for the Celebration of the Second Centennial Anniversary of the Settlement of New Hampshire.—By a Lady.

Two hundred years are numbered now,
  Since with the opening year
The white man breathed his ardent vow,
  And rais'd his altar here;
From Albion's haughty sea-girt land
  'Laconia's' Ancients come,
A patient, firm, and dauntless band,
  To seek a peaceful home.

And why should thus our Fathers spurn
  Their native earth and sky?
With visions bold their fancies burn;
  Their hopes and hearts beat high:
For, mid these northern wilds they see
  Perennial nature bloom,
And rivers roll in majesty,
  To fertilize their home:

And mighty lakes are spreading there,
  Where Eden islands show,
And 'chrystal hills' are swelling fair,
  Where mines of treasure glow:
Oh! at those visions never smile—
  They gilded well the gloom;
They softened oft the rugged toil
  That raised our happy home.

Nor think such dreams were fables vain,
  The *moral* we may find;
Though winter here in rigor reign,
  No frost can blight the *mind*.
It glows as pure, it soars as light
  As ocean's wintry foam;
It is the *freeman's* chrystal bright—
  The gem that gilds his home.

Then polish high the living *mind!*
  'Twas Athens' noblest praise;
Be learning here with labor join'd,
  Our laurels with our lays;
And God, who saw with tender care,
  Our Pilgrim Fathers roam,
Will bless those sons and daughters fair,
  That grace and guard their home.

—000—

CONNECTICUT.

DIED, at New Haven, Conn. on Monday April 28th, the hon. CHARLES CHAUNCEY, aged 66. Mr. Chauncey was, in the earlier part of his life, engaged in the practice of the law, and for a number of years afterwards held a seat on the Bench of the Superior Court of that State. He was esteemed a learned lawyer, an able advocate, and an independent and upright judge.

—

Died, at Hartford, Conn. on Monday, General SAMUEL WYLLYS, aged 85 years. He was educated at Yale College, and was graduated in September, 1759. In 1773, he raised the first company of governor's foot guards, and was the first commander. The legislature of this state in 1775 appointed him lieutenant colonel of general Spencer's regiment, and in January, 1776, Congress appointed him colonel of a regiment in the Connecticut line on the continental establishment, in which capacity he served with reputation through the war of the revolution. After the peace his services were found necessary in several civil capacities. He was also appointed brigadier and afterwards major general in the militia of the state. He was deputy grand master of the Grand Lodge of the state, and a member of the Connecticut Academy of Arts and Sciences. He succeeded his father and grandfather as secretary of state, and continued in that office until the year 1809, when a paralytic affection induced him to resign it. He was buried last Thursday with military and masonic honors.

—000—

MASSACHUSETTS.

DIED at Boston, April 18th, the honorable GEORGE CABOT, in the seventy-second

year of his age. This gentleman was president of the Hartford Convention, which has just received its fair trial and formal condemnation by the people of Massachusetts. Mr. C was, politics out of the question, a gentleman of the highest respectability. In his death, the community in which he lived, and his connections and friends in particular, have sustained a loss, which to the latter is irreparable.

—

Obituary notice of Dr. Aspinwall.

THIS venerable physician paid the great debt to nature on the 16th April, 1823, having nearly completed his eightieth year. He was born at Brookline, (Mass.) June the 3d, 1743; and he lived and closed his long and useful life in his native town. Dr. ASPINWALL was descended from Peter Aspinwall, who came from Toxtath Park, near Liverpool, England, in company with the four thousand emigrants, about the year 1630, and settled at Dorchester. Peter Aspinwall afterwards purchased a farm in Brookline, and moved there in the year 1650. His great grand son, the subject of this notice, was the sole survivor of three generations, that were born on this farm.

At the age of ten years, Dr. ASPINWALL lost an eye by the rebounding of an arrow, shot by him at a target. This misfortune induced his parents to give him a public education. He was fitted for college by the Rev. Amos Adams, minister of Roxbury; to whose house Dr. A walked every day during his preparatory studies, to recite. He was graduated in 1764, of the class with the late Dr. Hunt, of Northampton, and Governor Strong. He taught the grammar schools, for three years, after graduation, successively at Groton, Brookline, and Brighton. Having determined on devoting his life to the science of medicine, he pursued his studies with the celebrated Dr. Benjamin Gale, of Killingworth, Connecticut, who was son-in-law to the famous physician and divine, Dr. Elliot, whose practice extended from his residence in Connecticut as far as Roxbury, Mass. he being particularly noted for curing the dropsy. On leaving Killingworth, Dr. ASPINWALL pursued his professional studies at the Hospital, in Philadelphia, a circumstance more remarkable then, than a visit at the present day to the seats of medical science in Europe.

When the war took place with Great Britain it was Dr. ASPINWALL's desire to engage in the military service of his country, being possessed of an hereditary attachment to the rights of the people, a jealousy of the prerogative of the king, and entering with enthusiasm into the cause of his countrymen. He accordingly applied for a commission, but his kinsman Dr. (afterwards gen.) Joseph Warren, dissuaded him from it, by urging that there was a greater want of surgeons and physicians at that juncture. He therefore accepted the appointment of surgeon to general Heath's regiment, and soon after that of deputy director to the Hospital on Jamaica Plain, to which office he was named by general Warren. On the great day of Lexington battle, Dr. ASPINWALL was a volunteer combatant, and personally engaged in the contests. He bore from the field the corpse of his father-in-law, Isaac Gardner, Esq. who commanded the militia of Brookline on that occasion, and fell near Cambridge, having his body perforated with twelve bullets.

In the affairs of his native town, and the birth place, and place of burial, of so many kindred, Dr. ASPINWALL ever took a lively concern. He devoted much of his time to its interests, in various offices. He represented the town in the General Court several years; was thrice elected a senator, and served as chancellor one term, when he declined political life.

Dr. ASPINWALL made a public profession of religion at an early age, and during life he maintained a good profession.

Dr. ASPINWALL was a fellow of the Massachusetts Medical Society and a justice of the peace throughout the commonwealth. For the last seven years he had been blind; intense application, and the habit of writing and reading to a late hour at night, with but one eye, had occasioned a cataract to form over it. Dr. Smith attempted to remove it, but was unsuccessful, and the little light that remained was unfortunately totally extinguished.

[*Bost. Patriot.*

—

BOSTON, MAY 30.

We announce the decease of the hon. JOHN PHILLIPS, of this city. He was in his seat at the Senate Board on Wednesday, and died yesterday morning at 9 o'clock. The suddenness of this melancholy event has cast a gloom over the countenance of every citizen, and filled every heart with regret.

—ooo—

NEW-YORK.

MARCH 30. In the very heavy gale of this day Mr. DAVID DUNHAM, one of our

most respectable, wealthy, and enterprising merchants, and a most useful citizen, was accidentally drowned on his way home from Albany. He took passage in the steam-boat Richmond, and in consequence of the accident to that boat, embarked, with several others, on board a sloop. The wind was high, and a heavy swell in the river so as to render the navigation very rough. While in the act of giving assistance, by holding on to a rope, which he had thrown around his wrist, a sudden swing of the boom to which it was attached, took him from the deck and precipitated him into the river about ten feet from the vessel. The sloop was running at the rate of ten miles an hour, and could not put about in time to save him; and although great exertions were made, was not able to find the body. This event happened about two o'clock in the afternoon, a mile above Verplanck's Point.

—

Died, on the 21st of March, ult. JOSEPH MUNGER, Esq. of Paris, Oneida county, New York aged sixty-three. It is seldom that we have to record the death of a man whose life has been so uniformly spent in the cause of religion, of virtue, and of his country. But the hero, the patriot, the christian has gone. An aged mother of ninety-two, a tender wife, and thirteen children, together with other relatives, survive to mourn his departure. JOSEPH MUNGER was born in the year 1760, and early entered the service of his country. He joined the band of patriots, and was in several of the principal battles fought during the revolution, in all of which he served with reputation.

—

Died at Canaan, Columbia county, New York, on Tuesday last, after a long and painful illness, hon. JONATHAN WARNER, in the seventy-fifth year of his age. In the struggle for our independence, he ardently espoused the cause of his country. In almost every predatory excursion, he bore an active part, and assisted in the memorable capture of Burgoyne.

—

Died, on the 2d day of May, after a severe illnes of sixteen days, the honorable JOSEPH SPENCER, of Rochester, Monroe county, aged thirty-three years and four months, a member of the Senate of that state. Mr. Spencer was a native of Connecticut, and the son of Isaac Spencer, Esq. treasurer of that state.

He graduated at Yale College in the year 1811, with the reputation of an excellent scholar, and with the highest honors of the institution. He read law with Messrs. Gold & Sill, in Whitesborough, where he completed his law education, and subsequently removed to Rochester, and commenced the practice of his profession. From that period, down to the time of his election to the Senate, and to the hour of his death, he continued in the honorable discharge of the official duties which the liberality of his fellow-citizens, from a just estimation of his worth, had conferred upon him, and to merit and enjoy their confidence and regard.

—

Died suddenly, at New York, May 9th, in the eighty-second year of his age, JAMES MOTT, a distinguished member of the Society of Friends. In the death of this venerable father in Israel, society has lost one of her brightest luminaries, and most distinguished members, who combined humility with virtue, and gentleness of manners with a lively and interesting conversation. Both young and old found pleasure in his society, and courted his friendship. The benign influence of religion cast a halo over his character, which time will never obliterate, and illumined his countenance, which always beamed with peace and good will to his fellow man.—His virtues will long be cherished by the wise and good and revered by future ages. In the various important stations which he held in the society of which he was a member, he conducted himself with that purity and uprightness which gave universal satisfaction, and endeared him to his friends. Although the rude hand of time had made inroads upon his constitution, yet his intellectual faculties remained strong and clear until the hour of his death. By those who knew him best, he was most endeared, and none left his society without pleasure and delight, and respect for his character. He died in a good old age, with a firm confidence of receiving the rewards of a well spent life, and entering into the haven of eternal rest and peace.

—

At Scarsdale, Westchester county, New York, May 22d, in the eighty-seventh year of his age, JONATHAN G. TOMPKINS, Esq. father of the Vice-President of the United States.

—000—

NEW JERSEY.

DIED, on Tuesday evening, March 4th, at his late residence on Mount Gilboa, in Amwell, Hunterdon county, New Jersey,

JOHN LAMBERT, esq. in the seventy-seventh year of his age, after an illness of about twenty-one hours, with paralysis, which from its first attack, rendered him in a great measure speechless. Mr. Lambert had been many years a member of the Legislature of New Jersey, vice-president of Council, a member of Congress, and senator of the United States from that state. Since his retirement from office, he had been asssiduously engaged in the cultivation of his farm, in which he took delight; and had manifested but little disposition to mingle with the busy world, or to participate in the more troublesome transactions of public life.

—

At Newark, on the 19th of April, in the 70th year of his age, Mr. LEVI HOLDEN—several years distinguished by gen Washington, as a favorite of his guard, and as such was long a member of that great man's military family. It is unnecessary to say more in favour of the good conduct of Mr. Holden, than that Washington was his friend.

—000—

PENNSYLVANIA.

IN the 47th year of his age, Mr. SAMUEL RELF, late editor of the Philadelphia Gazette. On his way from the office, early on Saturday evening the 8th instant, he had a severe fall on the ice, on the pavement near Ninth in Chesnut street, which, breaking his right arm above the elbow, and considerably injuring his body, in a few days terminated his earthly career. Mr Relf became editor and proprietor of the Philadelphia Gazette shortly after the lamentable fire in Chesnut street, on the night of the 27th January, 1797, in which the wife and three children of Mr. Andrew Brown, the founder of the paper, perished in the flames, and himself was so much burnt that he survived but a few hours. Mr. Relf was a uniform federalist of the Washington school—frank, liberal, and generous; his pen, his purse, and his press was always devoted to the cause of charity and good will towards man. In temper he was so mild, that it has often been remarked by those who knew him for more than thirty years, they never saw him angry. He has left, to regret his departure a most affectionate wife, daughter, four sons, a worthy brother, and a large circle of sympathising friends and acquaintances.

—

Died, on Sunday morning, March 9th, THOMAS DOBSON, Esq. for many years an eminent printer and book-seller, of the city of Philadelphia; a man of the purest morals and most devout piety, and who enjoyed the respect and reverence of all who knew him.

—

Died, at his residence, in Allen township, Northampton county, on the 26th February last, in the seventy-ninth year of his age, general ROBERT BROWN, a patriot and soldier of the revolutionary war. The deceased was universally respected. The urbanity and republican plainness of his manners—the uprightness and probity of his character, secured to him the affections and esteem of all who knew him. He was a member of the Senate of Pennsylvania for some time He was then called upon by the freemen of the District to represent them in the Congress of the United States, of which body he continued a member for sixteen or seventeen years, and proved himself invariably, in that station, a firm and undeviating patriot.

—

Died at Philadelphia, on Monday morning, April 7th, after a lingering illness, captain FREDERIC BIRD, (an old revolutionary officer,) in the ninety-sixth year of his age.

—

Died in Philadelphia, on Saturday evening, ENOS BRONSON, Esq. formerly editor and proprietor of the United States' Gazette, aged forty-eight years.

—

Died in Philadelphia, on the 11th June, captain PAUL COX, in the 84th year of his age. He was born in the North of Ireland, and came to this country before he was twenty years old. In the American revolution, of glorious memory, he was a decided but temperate whig; and was engaged both by sea and land, as a good soldier in defending this country, which had become his by adoption and all the tenderest ties of humanity. He continued to his last breath a firm friend of civil and religious liberty, of the American governments and people: and during life, had the satisfaction, besides filling other honorable offices in society, of giving his vote at three successive periods, as an elector of the state of Pennsylvania, for the persons who were then exalted to the Presidency of the United States.

—000—

DELAWARE.

DIED, at his residence near Smyrna, April 28th, the honorable JOHN FISHER, judge of the District Court of the United States for the Delaware District.

June 23. The honorable Jos. HASLETT, governor of the state of Delaware, died at his seat near Milford, on Friday morning last: governor Haslett, we understand, is the fourth who has died while holding that responsible office, within a few years. We also learn that Charles Thomas, Esq. the speaker of the Senate, on whom the duties of governor now devolve, lies dangerously ill.

—000—

MARYLAND.

DIED, at his residence (Mount Carmel,) near Port Tobacco, on the 27th of April aged seventy-four years, the Reverend CHARLES NEALE, Superior of the Society of Jesuits, in the United States, to which dignified station he had been appointed for the third time.

—

Died on Saturday, May 3d, at Annapolis, Mr. JONATHAN WATERS, aged 63, a soldier of the revolution.

—

Died at Annapolis, Md. Mr. THOMAS BREWER. He was one of the Maryland line which fought with such distinction, and suffered so severely at the battle of Long Island, and afterwards was under Washington in each of the engagements at White Plains, at Monmouth, at Brandywine, at Germantown, and in the van at the capture of the Hessians at Princeton, having been one of those who literally crossed the Deleware upon the ice without a shoe or stocking on his feet, to turn the fortunes of his country by that eventful enterprize. He was one of general Wayne's soldiers when he so gallantly stormed Stoney Point; and he partook in the heavy fought battle that resulted in the capture of general Burgoyne at Saratoga. Few soldiers saw more real service; few lived to enjoy more proudly the blessings his services had contributed to procure for his country. To live over again in story, the eventful period which a strong and accurate memory served him with, was one of the enjoyments of his age; the well earned reward which a grateful country had extended to him and his fellow soldiers, was one of the principal means of his pecuniary dependence for infirmity and age. In his intercourse with men, few honester men have lived; it had been his maxim of life to square his wants by his means, and owe no man a cent. A large number of citizens, with a detachment of the United States' troops from Fort Severn, accompanied him to the grave, and performed the last military honors to the soldier.

—

DIED, on Sunday evening last, 20th of April, at his seat near Oxford, in the county of Talbot, Eastern Shore, (*Æt.* 65,) JOHN LEEDS BOZMAN, Esq. a man highly respected in the society in which he lived, distinguished for his learning among learned men, a gentlemen of urbane manners and refined sentiment. He was profoundly versed in the science of the Law, and his mind was richly adorned and copiously stored with classical and miscellaneous literature. He will be handed down to future times as the first who successfully undertook to write a History of Maryland, and the world will long regret that he did not live to complete his excellent and impartial work.—*U. S. Gaz*

—

Died on Thursday, June 12th, at the residence of Mr. Carroll, of Carrollton, ELIZABETH HYDE HARPER, the second daughter of general Harper, of Baltimore, in the fourteenth year of her age.

—000—

DISTRICT OF COLUMBIA.

WASHINGTON, March 18th.

At Queen's Hotel on Capitol Hill, in the sixty-sixth year of his age, departed this life, the honourable BROCKHOLST LIVINGSTON, one of the associate justices of the Supreme Court of the United States This distinguished citizen has long occupied a conspicuous place in the public eye, and his talents and worth are too well known to require an obituary notice. On the bench of the state of New York, and since, on that of the Supreme Court of the United States, the public have long acknowledged in him the learned and independent judge, the finished gentleman, and truly benevolent man.

It is some consolation to his family and friends that he has sunk into the grave at a good old age, crowned with honors, and wept by all who knew him. To his afflicted family his loss was irreparable.

The remains of the venerable judge were removed to New York for interment, and the funeral service was performed by the Right Rev. Bishop Hobart, in Trinity Church. The following eulogy on the deceased appeared afterwards in the public papers of that city.

Mature in years and ripe in fame and honors, BROCKHOLST LIVINGSTON having discharged his obligations to society, has paid his debt to nature. A stroke like

this, however, timely, must be felt, for we are made to feel, and to grow better by the discipline of our feelings. There is a sorrow which is useless, affecting the animal rather than the moral nature.—None can be worthy of him we lament, but that which is chastened, restrained, and directed to elevate the man, or improve the Christian. It behoves us, therefore, to waive our idle lamentations, and imitating the manly and enlightened piety, which cheered and sustained the last hours of him whose loss we deplore; let us rather express our gratitude that we have so long enjoyed so great a blessing, and let each individual who knew and loved or admired him do what he can do to render permanent the beneficent influence of his example.

His judicial character is, of course, the most interesting to the public, and as a judge, his character was very peculiar and strongly marked. He was eminently a man of genius, of strong, vivid and rapid perceptions, and the frankness of his character always prompted the immediate impression of his convictions. Such a disposition and habit must of course, and not unfrequently, induce mistakes: But here intervened a redeeming principle resulting from one of the most peculiar characteristics of his happily composed nature. For a man of strong and ardent genius, and profound learning, and these too rendered conspicuous by great reputation and high office, judge Livingston was in one respect, almost a miracle. *He seemed to be without vanity.* He did not listen, or affect to listen, to arguments in opposition to his declared opinions merely from official decorum, but his mind was literally and truly open to conviction. Others may have committed fewer errors, but who has left fewer unrepaired?

The kindness and suavity of his character were strongly displayed in the discharge of his official duties. At every moment of his life he was an amiable and a finished gentleman. He ever seemed to be of opinion that there was a dignity in the administration of justice, which reached even to its inferior ministers, and without ever forgetting the propriety of his station, he treated the gentlemen of the bar as his friends and brethren, over whom he was called, as it were, to preside for some temporary purpose.

To say that he was just and impartial, would be low and inadequate praise. He was prompt, laborious, and indefatigable. His own ease and pleasure always gave way at the call of duty. He never delayed or slighted any thing—He often labored most without the stimulus of fame—He was, perhaps, rather too averse to the parade of display and publication. Causes were not unfrequently heard at his own house, and many of his most elaborate opinions, the result of laborious and profound investigation, were communicated only to the counsel interested.

In his intellectual habits he was cautions but not timid. He looked rather to practical results than abstract principles. Nevertheless his feelings and opinions were decidedly of a liberal cast. He desired to extend and improve legal science, and did not consider all knowledge and all wisdom to be bound up within the compass of English jurisprudence.

Our sketch must be rapid. Judge Livingston was eminently gifted with a fine public and social spirit. This temper was displayed in his zealous promotion of all liberal pursuits and institutions. He was a generous patron of literature. The same spirit diffused itself through his whole character. A strong impulse and glow of benevolence characterised all his intercourse with society. His manners were, to an unusual degree, attentive, kind, and affectionate; to his friends and indeed to all who deserved and required it—his aid was prompt, decided and efficient. In one word, his heart was full of warm kindly feeling which flowed out upon all around him.

It will be gratifying to all the friends of Christianity to know that the luminous mind of judge Livingston assented to its evidence; and that he made a public profession of his faith.

Any sketch of the character of judge Livingston, which did not mention his domestic qualities, would be unpardonably imperfect.

In all the relations of domestic life—and it is there that a man's true character is best known, and its influence—he was far above the reach of common place commendation. None but those who saw him in retirement and knew him intimately, can appreciate his character in this respect. He was even most affectionate, attentive, and considerate, exacting little for himself, and always consulting the interests and feelings of his family. The main object of his life, at least, that which seemed to interest him most, was to transfuse his own knowledge and character into the minds of his children. Every hour that could be spared from his public duties, and more than could well be spared from the time necessary for his relaxation and the care of his health, was devoted to their educa-

tion. He was their constant instructor.—Of such a man it is common place to say, that to his family his loss is irreparable. He has done all that the most devoted affection, and the most assiduous attention to their welfare could do for them here, and has gone to his reward. If his example and precepts have their just influence, they will in some good degree, continue to them his presence, and supply his loss.

—

Died, on Saturday evening, May 10th, Mr. DAVID YOUNG (brother of the late Moses Young) aged about 68 years. He was born at Newry, Ireland, and was distinguished through life for the mildness and inoffensiveness of his manners.

—

Died, on his passage to the West Indies, whither he had gone for the benefit of his health, JOHN JANNEY, of Alexandria, a respectable member of the Society of Friends.

The grand dome over the rotunda, in the centre of the Capitol of the United ted States at Washington, is now completely covered with a sheathing of copper; and the foundations of the superb portico, on the east front, are laid; so that this magnificent building is making rapid progress to completion. Some important alterations are making in the Hall of the House of Representatives, preparatory to the next Congress.

We shall rejoice to see in another year the walks in the Capitol square, among the handsome and flourishing plantation of shrubs and trees, rendered practicable for an evening promenade, than which we scarcely know any thing more desirable in our city. And there are very few positions that we have seen more beautiful; though the polite editor of the Port Folio has lately described us as living in a *waste* or *desert*.

"*De gustibus non est disputandum.*" For ourselves we must say that we infinitely prefer the diversified scenery of Washington, to the long, uniform, monotonous, drab colored streets, crossing each other at right angles, and smoothed down like a billiard table, which seem so delightful to some of our countrymen. And when we get on an eminence, where we can view almost all the public buildings, and see the wide Potomac receiving to its embraces the tributary Anacosta river, with the surrounding hills of Virginia and Maryland, enclosing the vale in which our infant city is raising new habitations and turrets every year, we are sometimes inspired with a visionary anticipation of future ages, when this great metropolis will in artificial, as well as natural grandeur, be worthy of the imperishable name it bears.

—000—

VIRGINIA.

Died, March 22d, at his residence in Isle of Wight county, after a short illness, col, JOSEPH W. BALLARD, commandant of the 29th regiment of Virginia militia. He commanded a battalion at Norfolk during the late war with Great Britain.

—

At his residence, on the 9th of May, in the fortieth year of his age, JOHN C. GRAY, Esq. one of the delegates to the General Assembly, for the county of Southampton, Virginia.

—

Died, in Augusta county, on the 6th of June, colonel ANDREW ANDERSON, a soldier of the revolution, and for nearly thirty years a member of the legislature of his native state.

—

Died, at his residence near the Sweet Springs, on the 4th of June, captain JOHN LEWIS, in the sixty-eight year of his age, a hero of the revolution, and owner of the above celebrated Springs.

—

Died in the town of Petersburg, on the 9th, DAVID ROBERTSON, Esq a native of Scotland, and one of the oldest and most respectable inhabitants of that town. The American public is well acquainted with the name of Mr. Robertson, and is much indebted to him, as the reporter of the Debates in the Virginia Convention on the Constitution of the United States.

—000—

NORTH CAROLINA.

Died, on the 1st of March, near Salisbury, general JESSE A. PEARSON, in the 45th year of his age. In the death of General Pearson, his native state, North Carolina, has been deprived of one of its most honorable, enlightened, and enterprising citizens. Society has lost one of its brightest ornaments. In the nearer and dearer relations of life, the tie is broken, which nothing but death could sever. Possessing the advantages of a liberal and polished education, and the best early associations, his intelligence was of the

first order—his manners peculiarly graceful—his deportment dignified and commanding. These qualities combined in an elegant and manly person, and pourtrayed by a countenance and features which illumined the whole, justly entitled Gen. Pearson to be ranked among the most accomplished gentlemen of the age.

—ooo—

SOUTH CAROLINA.

An original Character.

DIED, on Sunday, 2d March, at Bedford, his late residence, in Abbeville district, RICHARD ANDREWS RAPLEY, Esq.

This well known old man, about the year 1761, came from London to South Carolina, as the agent of Joseph Salvadore, in the management of the immense estate called the Ino's Land. Notwithstanding the devoted partiality for his native land, which seemed to increase with the length of his absence from it, in the revolutionary struggle, he zealously espoused the cause of his adopted country—and in various capacities contributed to its success in the desultory, predatory warfare of the back country.

A long while ago he settled upon a large and fertile tract of land on Long Cane Creek, in a small, rude, log cabin. His indigo and cotton fields soon extended as far as the eye would reach on every side. Always considering his habitation as but temporary, he propped its tottering corners, and piled upon it layer of boards over layer, while the timbers for the permanent edifice which filled his imagination, rotted again and again upon the spot long marked out for their erection. Passionately devoted to horses, without regard to pains or expense, he reared heads of the finest form and blood; grew young when he witnessed the public performance of his favorites, and, in his latest hours of infirmity, sought relief in the sight of his coursers in training.

Hospitable, well read, full of anecdote, and elated when company broke the series of his solitude, he was visited with pleasure by men of curiosity and refinement. In the little log house, which with difficulty could be singled out from the numerous negro cabins that surrounded it, were constantly found the richest viands for body and mind, the massive plate upon the rickety cross-legged pine table; the choicest collection of English and French literature on the coarsest, clumsiest shelves; and withal the oddest mixture of elegance and rudeness. He was an ardent admirer of beauty, a very pattern to the young of gallantry and ease of manners; yet he lived and died a bachelor, with a fund of cheerfulness, which neither disease, age, nor misfortune could exhaust; the greater part of his life was spent with no other security, than his faithful black domestics: and these he treated with the most affectionate tenderness.

He attained an age which could not have been less than ninety, and it is believed left neither will nor known relation.

—

Died at Charleston, capt. NEAL MAC NEAL, long, well, and universally beloved in Charleston. For nearly half a century this gentleman had commanded a ship trading from that port, generally to London. Skillful in his profession—purely benevolent in his disposition—honorable in his demeanor—and highly courteous in his manners, he was admitted into all the circles of society, and was welcome every where. His arrival was always the subject of congratulation. He well exemplified the union of bravery and philanthropy, *which characterise the gallant sons* of the ocean.

—

Died, at Centreville, in Pendleton district, colonel ELIAS EARLE, for many years successively a member of the House of Representatives, and of the Senate of South Carolina, and afterwards a representative in the Congress of the United States.

—

Died, in Union district, Mr. GARRET HENDRICKS, aged *one hundred and seven years one month and eight days.*

—

At Charleston, on the 19th April, BENJAMIN MOODIE, Esq. for many years consul of his Britannic majesty for South Carolina. Such was the amiable and correct deportment of this gentleman during his residence among us, (says the Charleston Courier,) that when the relations between this country and Great Britain were unfortunately severed by the late war, the affections of our city followed his departure, and welcomed his return again with joy. As a mark of respect, the colors of the shipping in the harbor were displayed at half mast, on the day of his death and the day following.

—ooo—

GEORGIA.

DIED, at the house of colonel B. C. Dupree, in Twiggs county, Georgia, on the

26th February last, major JAMES GORDON, in the ninety-first year of his age. He is one who suffered in the revolution, where he received many wounds. He was at Braddock's defeat and bore the name of King Corn-Stalk.

—000—

KENTUCKY.

DIED, on Sunday, the 16th March, at his residence in Grant county, general WILLIAM MOUNTJOY. Gen. Mountjoy was a most respectable citizen during the late war, he was distinguished for his zeal and services in defence of his country. His fellow citizens, on several occasions, have testified their respect for him, by electing him to a seat in the House of Representatives, and for several years to the Senate of the state. At the last August election he was again elected to the Senate for four years.

—

Died at his residence on Salt River, Mr. ANDREW BUNTIN, aged nearly ninety years. He was an old revolutionary soldier, and fought under Shelby at King's Mountain. At an early period he emigrated to Kentucky, and participated in the hardships and perils of the first settlers.

—

By the catalogue of the officers and students of Transylvania university, Lexington, for the present year, it appears that the total number of students in that flourishing institution, is 386.

—000—

OHIO.

Died, on the 26th ultimo, at his residence on Mill Creek, after a short illness, JOHN LUDLOW, Esq. in the seventy-first year of his age. The deceased was a captain in the revolutionary army, and one of the earliest settlers in this country. As sheriff and magistrate of the county, and as a legislator of the state, he was generally known, and highly and universally respected. Few men have lived a more useful life, or have died, leaving behind them a fairer or more honourable fame. He has left a large family to mourn his loss; consisting of his wife, twelve children, fifty-four grand children, and three great grand children, making, in all, seventy persons.

—000—

LOUISIANA.

DIED, at New Orleans, on the 21st April, after an illness of six days, in the forty-seventh year of his age, doctor WILLIAM FLOOD. The deceased resided in New Orleans about twenty-four years, during which period he practised medicine with eminent success. A remarkably clear and discriminating mind, combined with great professional experience, enabled him to discern the nature and causes of disease with almost the quickness and accuracy of intuition; while his indefatigable assiduity and his soothing deportment, by securing the affection and confidence of the sick, allowed him to apply the remedy with effect. Probably no man ever died in New Orleans whose loss is so severely felt by his friends, and so deeply and generally deplored by the public, as that of Dr. Flood.

—000—

MISSISSIPPI.

DIED, in the state of Mississippi, about the 20th of April, Mrs. LEAKE, wife of the hon. Walter Leake, governor of that state, and lately a senator of the United States.

—

Died, On Sunday the 6th instant, major JOHN F. BOWIE, of Monticello, Mississippi. In his youth he entered the army of the United States, where he continued for a number of years, till promoted to a captaincy. When war was declared against England, major Bowie was among the patriots of his country that took the field, and in many extreme and perilous dangers exposed his life.

—

Died, at his residence, in Jefferson co. on the 8th instant, in the 40th year of his age, the honorable WILLIAM B. SHIELDS, United States' judge for the Mississippi district. He has left an affectionate wife, and seven children, besides a large circle of connexions and friends, to whom he was deservedly endeared, to lament his untimely fate.

—000—

ALABAMA.

Died, at Mobile, on the 20th March, TALIAFERRO LIVINGSTON, Esquire, marshal of the district of Alabama, aged forty-one. On Saturday his remains were interred with masonic honours.

—

Died, in April last, the hon. JOHN WILLIAMS WALKER, lately a senator of the United States from the state of Alabama, in the fortieth year of his age.

METEOROLOGICAL REPORTS.

BY ROBERT LITTLE.

Published by order of the Columbian Institute, Washington.

REPORT FOR JANUARY, 1823.

THIS month has been unusually mild and moist in the District of Columbia, with less variation of temperature than we recollect to have occurred at this season, as the following table will shew. In the description of weather, the word *fine* is used to signify clear, unclouded.

		Fahrenheit's Thermometer.			*Wind.*	*Weather.*
		8 A M	2 P M	9 P M		
JANUARY.						
Wednesday	1	38	41	37	NE	Sleet and snow
Thursday	2	40	42	38	SE	Alternate fog and sunshine
Friday	3	36	40	40	SE	Thick fog
Saturday	4	40	42	42	E	Rain
Sunday	5	44	41	28	N	Rain A. M., N. W. P. M. and clear, frost.
Monday	6	30	34	29	NW	Fine
Tuesday	7	28	33	30	N	Fine
Wednesday	8	34	42	40	SE	Fine
Thursday	9	38	49	46	SE	Fine
Friday	10	49	45	39	SW	High gales of wind
Saturday	11	35	45	40	SW	Fine, but windy
Sunday	12	45	45	40	SW	Fair, but windy
Monday	13	37	40	37	NW	Fair and strong gale
Tuesday	14	35	42	37	SW	Fine
Wednesday	15	35	48	42	SW	Fine
Thursday	16	40	46	40	WSW	Fine
Friday	17	45	49	43	SW	Fine
Saturday	18	42	52	52	SE	Fine
Sunday	19	52	57	55	SW	Cloudy, rain at night
Monday	20	55	52	54	SE	Heavy continued rain
Tuesday	21	51	53	50	W	Fine
Wednesday	22	43	50	48	E	Cloudy, P. M. rain
Thursday	23	46	54	46	W	Fog, P. M. N. W. fine
Friday	24	40	44	41	N	Fair
Saturday	25	42	44	33	E	Heavy rain
Sunday	26	44	46	44	NE	Cloudy
Monday	27	42	43	41	NE	Rain, P. M. fair
Tuesday	28	40	44	35	NW	Fine
Wednesday	29	34	39	36	W	Fir
Thursday	30	34	40	37	SW	Cloudy
Friday	31	34	39	30	SW	Heavy gale, with snow P. M.

Average heat during the day, for the whole month forty-two degrees.

Snowy days	2
Rainy	6
Cloudy	6
Fair	5
Fine	12
Total,	31

REPORT FOR FEBRUARY, 1823.

THE severity of the winter has been more felt during this than the preceding month; the number of unfavourable days has been greater, and the temperature of the atmosphere generally lower.

		Fahrenheit's Thermometer.			*Wind.*	*Weather.*
		8 A M	2 A M	9 P M		
FEBRUARY.						
Saturday	1	27	37	37	SW	Fine, but windy
Sunday	2	37	45	43	WSW	Cloudy
Monday	3	40	44	41	SW	Snow—melted p m
Tuesday	4	35	38	34	NW	Fine
Wednesday	5	29	39	34	NW	Fair. NE snow p m
Thursday	6	24	30	25	NW	Cloudy
Friday	7	20	27	25	NW	Fair. S E cloudy p m
Saturday	8	18	27	25	NW	Fine
Sunday	9	25	27	27	NNW	Cloudy
Monday	10	27	39	37	NE	Sleet and rain
Tuesday	11	33	41	35	NE	Clouds and sleet
Wednesday	12	33	40	37	SE	Sleet, fair at intervals
Thursday	13	35	39	33	SE	Snow
Friday	14	33	40	39	NE	Sleet—p m heavy rain
Saturday	15	25	33	25	NW	High wind
Sunday	16	23	33	27	SW	Strong gale
Monday	17	27	31	30	SW	Fair
Tuesday	18	31	35	31	NW	Fair, but windy
Wednesday	19	31	40	35	SE	Fair
Thursday	20	35	49	45	SW	Sleet and rain S E p m
Friday	21	39	52	46	SE	Fine
Saturday	22	43	62	49	N	Hazy. Fair p m
Sunday	23	40	45	37	E	Deep and continued snow
Monday	24	37	42	35	N W	Fair. Wind N E p m
Tuesday	25	35	47	40	NW	Fine; snow on the ground
Wednesday	26	41	49	41	SE	Cloudy and showers
Thursday	27	30	41	31	NW	Fine
Priday	28	23	34	30	NW	Fair, but hazy.

Average heat of the day, throughout the whole month, thirty-five degrees.

Snowy and rainy days	10
Cloudy	8
Fair	5
Fine	5
Total,	28

REPORT FOR MARCH, 1823.

THIS month the weather may have been considered as peculiarly seasonable, according to the long established character of March: it has presented us with a continual alternation of sunshine and rain, snow and dust, wind and clouds, closing the scene with one tremendous and desolating storm. The average temperature, however, was raised 12 degrees above February

		Fahrenheit's Thermometer.			*Wind.*	*Weather.*
		8 AM	2 PM	9 PM		
MARCH.						
Saturday	1	30	45	40	SW	Fine
Sunday	2	40	52	46	SW	High winds
Monday	3	29	40	32	NW	Fine but windy
Tuesday	4	29	45	38	NW	Fine. P M SW
Wednesday	5	39	52	45	SE	Squalls of wind and rain
Thursday	6	53	57	46	SW	Thunder showers P M NW
Friday	7	42	53	43	NW	Fine
Saturday	8	42	58	50	NW	Fine
Sunday	9	46	62	45	SE	Fine
Monday	10	39	39	37	NE	Clouds, wind, sleet, rain
Tuesday	11	37	40	35	E	Sleet and rain, all day
Wednesday	12	42	55	50	SW	Fog P. M. fair W
Thursday	13	45	57	52	SW	Fine
Friday	14	48	54	47	SE	Rain
Saturday	15	47	54	46	SW	Fine
Sunday	16	44	60	55	SW	Fine
Monday	17	53	60	53	SW	Hazy
Tuesday	18	51	67	54	SE	Heavy rain and gales
Wednesday	19	45	60	47	NW	Fine. P M rain
Thursday	20	40	47	40	N	Sleet and rain
Friday	21	40	50	46	NW	Fine
Saturday	22	50	65	60	SW	Fine
Sunday	23	55	67	61	SW	Fair, with much wind
Monday	24	55	57	50	W	Continued gales
Tuesday	25	40	54	47	N	Fine P M. SE hazy
Wednesday	26	40	43	40	NE	Rain, sleet, snow.
Thursday	27	44	49	44	N	Fair
Friday	28	45	53	46	NW	Fine
Saturday	29	46	54	45	SW	Fair; P M heavy gales from SE rain
Sunday	30	39	43	40	NE & NW	Blowing with fury all day; sleet, snow, rain much damage by sea and land
Monday	31	45	53	45	NW	Equinoctial gale, subsiding gradually

Average heat during the day for the whole month forty-seven degrees.

Snowy and rainy days	10
Cloudy	3
Fair	6
Fine	12
Total,	31

REPORT FOR APRIL, 1823.

THIS month has been, upon the whole, unusually cool, windy, and variable. The spring advances very slowly; yet the increase of temperature from the last month has been eleven degrees, although in the middle of the month we had a night or two of severe frost.

		Fahrenheit's Thermometer.			*Wind and Weather.*
		7 AM	2 PM	9 PM	
APRIL.					
Tuesday	1	47	60	50	NW. Fine; P M SW
Wednesday	2	47	66	62	SW. Fine
Thursday	3	59	69	61	SW. Cloudy, windy, rainy, P M
Friday	4	58	56	46	NW. Fine
Saturday	5	43	55	47	NW. Fine
Sunday	6	55	63	55	SW. Windy
Monday	7	63	65	60	S Showers, thunder, strong gales
Tuesday	8	49	56	47	NW. Fair
Wednesday	9	43	57	50	N. Fine
Thursday	10	51	68	56	NE. Cloudy and slight showers
Friday	11	50	52	46	NE. Showers; heavy rain at night
Saturday	12	45	51	46	NE. Cloudy
Sunday	13	45	63	56	NE. White frost AM; fine P M
Monday	14	52	68	60	SW. Fine
Tuesday	15	52	65	60	E. Hazy and showers
Wednesday	16	58	68	62	SE. Rain
Thursday	17	60	72	68	SW. High wind; showers at night
Friday	18	65	72	66	SW. do do
Saturday	19	60	62	57	N. Cloudy, SE rain
Sunday	20	60	72	66	SW. Cloudy, slight showers
Monday	21	66	76	66	SW. Fine; heavy shower P M
Tuesday	22	62	76	62	NW. Fine
Wednesday	23	64	76	64	SW. High wind
Thursday	24	50	58	48	NW. Strong gale
Friday	25	48	61	56	SW. Fine
Saturday	26	56	71	64	SW. Heavy gales of wind
Sunday	27	62	74	68	SW. Fine, but much wind
Monday	28	56	58	52	NE. Cloudy
Tuesday	29	50	55	54	NE. Clouds and cold wind
Wednesday	30	52	54	50	E. Heavy rain all day

Average heat for the month, fifty-eight degrees.

Rainy days	10
Cloudy	4
Fair	6
Fine	10
Total,	30

REPORT FOR MAY, 1823.

REMARKABLY fine and seasonable upon the whole, though the temperature has been lower than usual during this month. The mean heat only increased eight degrees from April: this owing to the prevalence of very brisk and variable winds, chiefly from the Eastward, with occasional showers. The quantity of Rain is ascertained by an instrument lately imported from London, constructed on scientific principles. The mean heat is also given according to three different thermometrical scales in common use.

		Fahrenheit's Thermometer.			*Wind and Weather.*	*Rain.*
		7 AM	2 PM	9 PM		*in 100 pts.*
MAY.						
Thursday	1	50	53	52	E. Rainy	.55
Friday	2	52	64	60	NNW. Fair, rain at night	.17
Saturday	3	57	68	61	SW. Fine	
Sunday	4	65	70	56	SW. and NW. Brisk wind	
Monday	5	50	62	51	N. Fine	
Tuesday	6	56	66	59	SW. Fine	
Wednesday	7	60	70	66	SW. Fair	
Thursday	8	65	70	64	SW. Showers	.04
Friday	9	60	72	62	NW. Clouds and wind	
Saturday	10	58	68	61	E and NW. Fine	
Sunday	11	56	66	60	NW. Fine	
Monday	12	54	61	56	NE and SE. Cloudy and showers	.06
Tuesday	13	52	60	57	SE. Thunder and rain	.45
Wednesday	14	58	67	57	NE. Cloudy, showers	.12
Thursday	15	60	70	61	SE, Cloudy	
Friday	16	61	66	67	SW and SE. Wind, slight showers	.00
Saturday	17	68	73	66	NW. Fair	
Sunday	18	68	83	70	SES. Fine	
Monday	19	68	85	76	SW and SE. Fine	
Tuesday	20	76	90	78	SE. Thunder gust at night	.46
Wednesday	21	70	87	78	SSE. Fine	
Thursday	22	72	84	70	NW. Brisk wind	
Friday	23	70	80	70	N. Fine	
Saturday	24	65	84	76	SE. Fine but windy	
Sunday	25	75	84	74	SW. Clouds and wind	
Monday	26	64	74	64	NW. Fine	
Tuesday	27	65	76	68	SE. Fine	
Wednesday	28	66	75	70	SW and SE. Showers at night	.24
Thursday	29	72	72	65	SW. Rain	.20
Friday	30	65	72	67	NW. Fine	
Saturday	31	62	70	64	N. Fine but hazy	
					Total of rain,	2.29

Fine days	17
Cloudy	4
Rain	10

	Fahrenheit.	*Centrigade.*	*Reaumur.*
Average heat for the month	66	19	15
Maximum	90	32	26
Minimum	50	10	8

REPORT FOR JUNE, 1823.

THE early part of this month was so dry as to excite serious apprehensions among agriculturists; but the last ten days have redeemed its character in this respect. The rain fallen in that period exceeds the whole in the month of May by one-tenth of an inch. The quantity of rain marked against each day, is what fell between sunset on the preceding day, and the same time on the day against which it is registered. The mean heat of this month is greater than that of May, eight degrees, on Fahrenheit's thermometer.

		Fahrenheit's Thermometer.			*Wind and Weather.*	*Rain.*
		7 AM	2 PM	9 PM		*in* 100 *pts.*
JUNE.						
Sunday	1	62	69	63	NE. SE. Hazy	
Monday	2	66	78	67	S. Fine	
Tuesday	3	67	80	72	SW. Fine	
Wednesday	4	70	82	74	SW. S. Fine	
Thursday	5	68	88	77	SW. Fine	
Friday	6	75	85	76	NE. Fine	
Saturday	7	75	87	76	S. Hazy	
Sunday	8	72	77	60	N. Slight shower	
Monday	9	58	62	60	NE. Cloudy	
Tuesday	10	64	69	64	SE. Fair	
Wednesday	11	64	73	65	SW. Fine	
Thursday	12	66	76	63	SE. Fine	
Friday	13	68	85	76	SW. Fair and thunder	
Saturday	14	76	93	83	SW. N. High wind and lightning	
Sunday	15	74	88	76	NE. SE. Fine	
Monday	16	74	87	78	SW. Fine	
Tuesday	17	78	92	80	SE. SW. Brisk wind	
Wednesday	18	82	93	78	SW. S. Hazy.	
Thursday	19	80	86	82	SW. Clouds and distant rains	
Friday	20	76	81	74	NE. SE. Slight showers	.09
Saturday	21	73	83	75	ESE. Cloudy and rain	.44
Sunday	22	77	71	64	SW. NE. Heavy showers	.32
Monday	23	63	70	67	NE. SE. Cloudy	
Tuesday	24	67	76	69	SE. N. Showers	.23
Wednesday	25	71	80	75	NW. SE. Fine	.02
Thursday	26	72	70	65	SE. NE. Showers	.06
Friday	27	65	72	72	NE. Showers.	.19
Saturday	28	74	81	74	SW. Thunder gust	.30
Sunday	29	74	82	76	SW. W. Heavy showers	.38
Monday	30	72	65	65	NE. Rains	.41
					Total inches,	2.41

Rain near Macclesfield, England, in June, 1822, ... 2.90

Fine days	16
Cloudy	4
Rainy	10

	Fahrenheit.	*Centigrade.*	*Reaumur.*
Average heat for the month . .	74	22	19
Maximum	93	34	27
Minimum	58	14	11

In these comparisons, all fractions are dropped, as insignificant, and the nearest approximation given in round numbers. The mean heat in Cheshire (England,) during the corresponding month, 1822, was sixty-one degrees Fahrenheit.

REFERENCES TO MESSRS. DEURBROUCQ & NICHOLS'
Patent Apparatus for Fermentation.

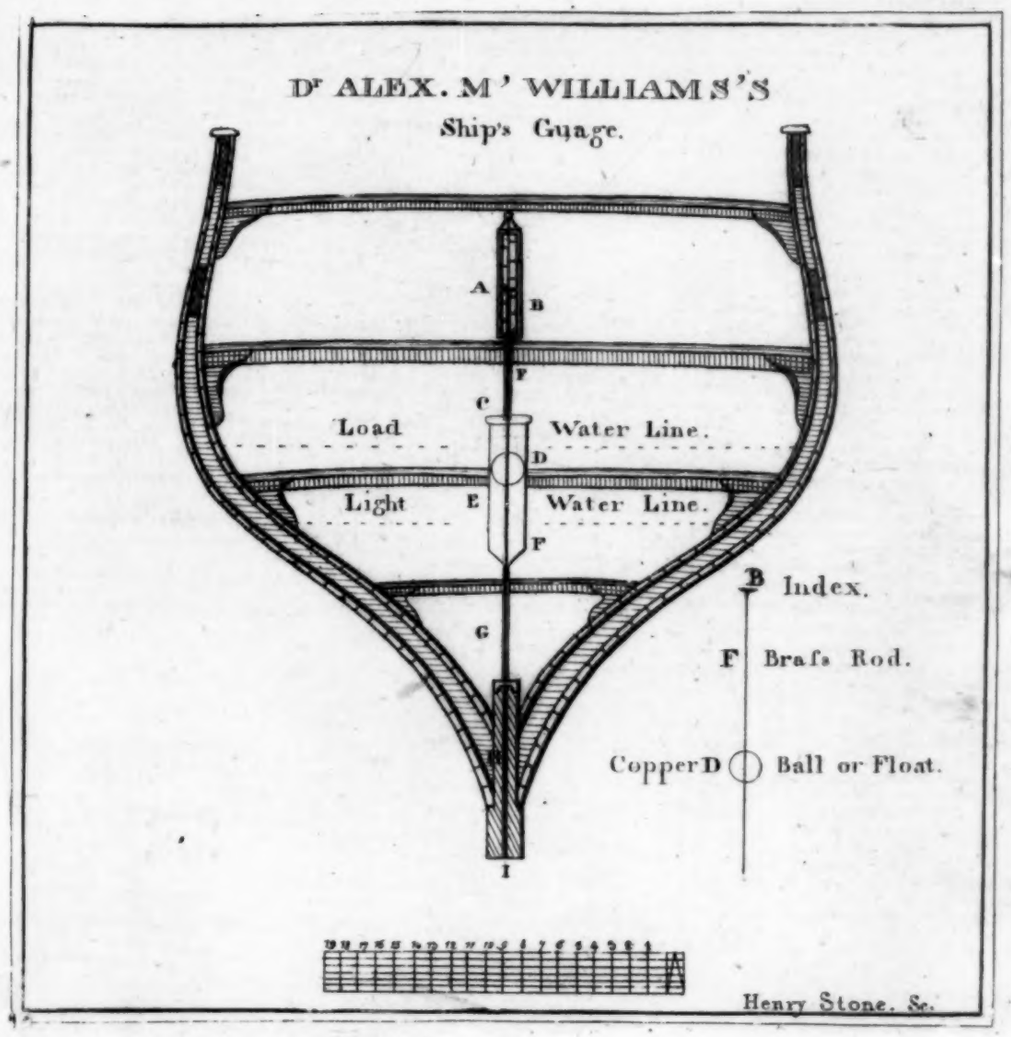
A, A, closed vat in which the process of fermentation is carried on.
B, condensing cone, communicating immediately with the interior of the fermenting vat.
C, C, small channel extending round the interior base of the cone, being adapted to receive the condensed alcohol and essencial oils, from whence they are conducted down the small pipe D into the vat.
E, E, reservoir for containing cold water surrounding the cone.
F, exit pipe, communicating with the interior of the cone, its extremity being immersed some inches below the surface of the water in the the small tub G, from whence the non-condensable gasses are permitted to escape into the atmosphere.
H, cock to draw off the water from the reservoir E, E.

See page 70.

REFERENCES TO THE LOCK FOR CANALS.

A, and B, are locks having a communication by means of the sluices W and X in the middle pier.
C, D, the gates.
Y, Z, are side sluices, whereby lock A will continue to empty, and B to fill, till the water in each obtain the level of the lower and upper canal.

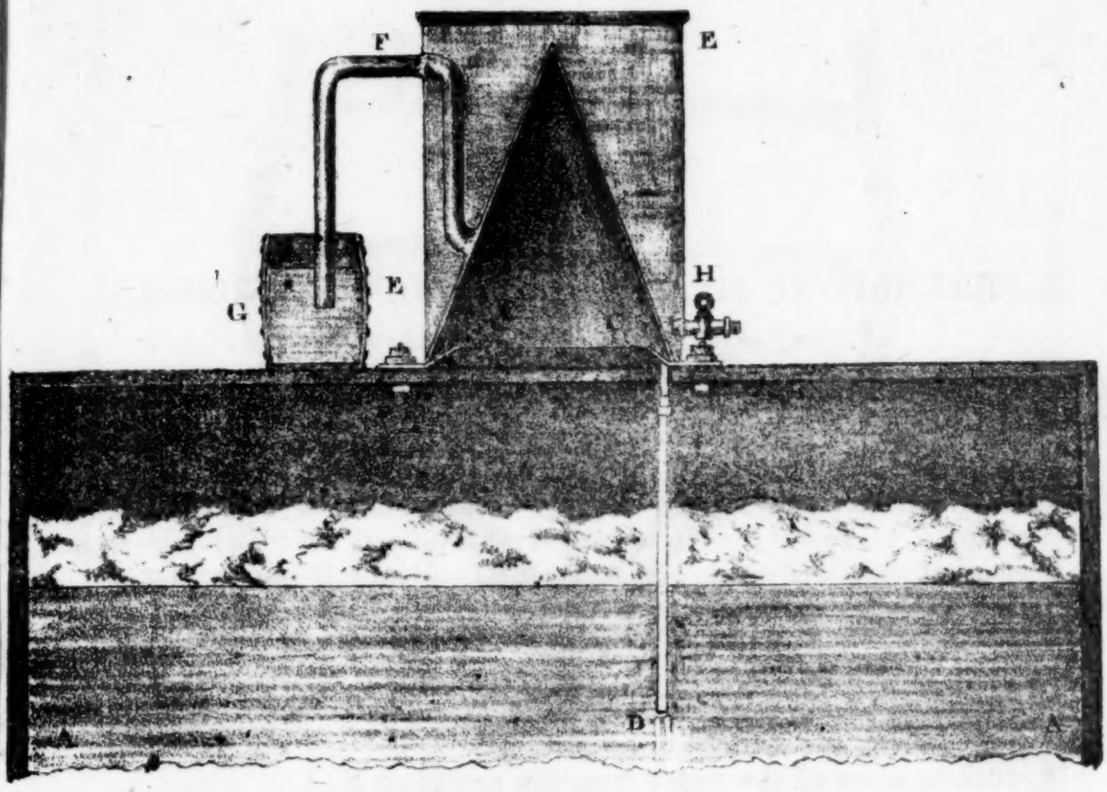
See page 77.



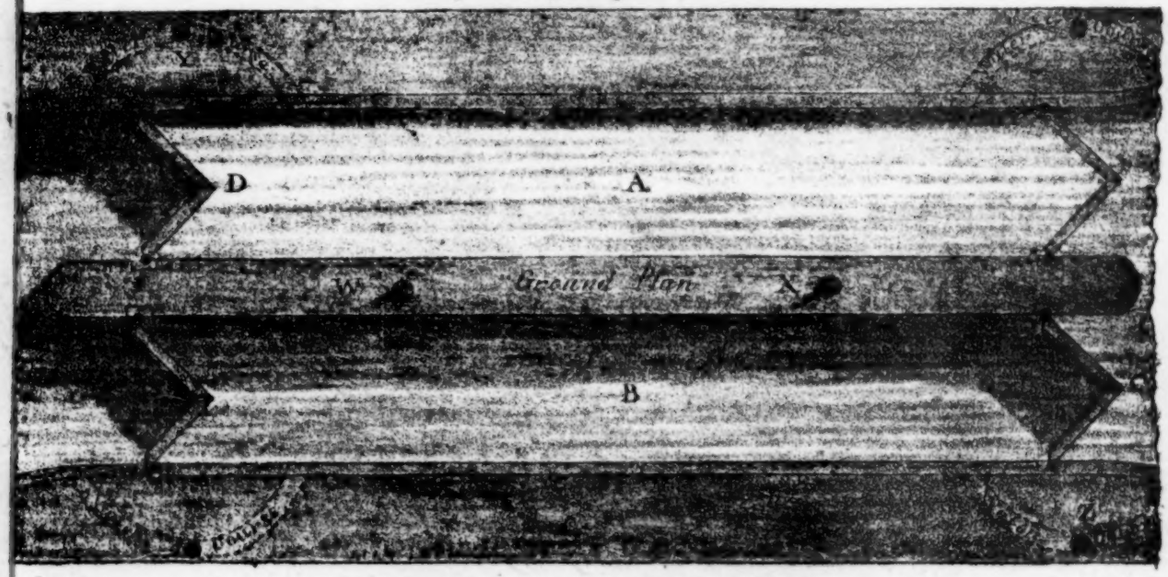
REFERENCES.

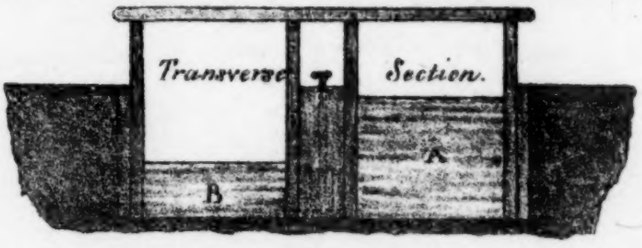
A, the scale in feet and inches.
B, the index.
C, the rod to which the float is attached.
D, the ball or float.
E, the reservoir.
F, a brass rod.
G, a small tube between the reservoir and keel.
H, a small tube passing through the keel.
I, the opening in the keel, through which the water is admitted.

Messrs Deanbrowcy & Nichols' Patent Apparatus.



Plan of a Lock, designed by R. H. Gower; for the Regent's Canal Company, to save Water, and give facility to the passage of Vessels.





Hind's Stone, Lithog.rs Wash.

PROSPECTUS OF THIS WORK, AS ISSUED MARCH, 1828.

It is thought that a work of this nature, compiled and published at t seat of the general Government, will possess advantages which cannot f to render it extensively interesting and useful. The energies of this gre nation, will we trust for a long period be directed almost exclusively to i provements in Agriculture, Manufactures, and other branches of useful a productive labour. Remote from the political agitations of Europe, stro in her own internal resources, and governed by a wise, pacific policy, s may pursue her course of advancement in all that enriches and ornamer society, and adds to the conveniences and comforts of civilized man. form a repository, in which the most important features of this progre may be recorded, is the principal object of this proposed work; and collecting and condensing materials, to aid practical men in their further tempts at improvement.

For this purpose it is proposed to give, authentic Specifications of Pa ents obtained for useful discoveries, and improvements of machinery in t United States; extracts from similar publications in England, containing a counts of the most recent and valuable discoveries in that country. The communications will be accompanied with plates illustrative of their su jects. Notices of new publications, on subjects connected with the vario branches of national industry, will also form a regular part of the wor The Editor also relies with confidence on an extensive correspondence, f original communications on these topics.

Abstracts of such Acts of Congress as relate to Trade, Agriculture, C nals and objects of general improvement, will be accurately given; and i portant national events chronologically recorded. Also an Obituary eminent characters in the various States of this Union; and a Meteorolog cal Report.

The general plan of the proposed work is thus developed in few word and without any extravagant pretensions; it may admit of modification, e largement and improvement in its progress, by the assistance of scientif correspondents, and the growing light of experience; but Politics and R ligion, will be always inadmissible, as the work is intended for no party, b to be purely national and patriotic.

To Patentees this work may be found of great advantage; and their sp cifications, with illustrative plates, from such drawings as they may furnis shall be carefully inserted, at a trifling expense to themselves, by an Arti engaged to perform all the graphic illustrations. For further informatic on this subject they are requested to correspond with the Editor. Subscr bers at a distance will please to order payment for their numbers in Was ton, Baltimore or Philadelphia, and direct how they will have the numbe transmitted to them.

N. B. The present number being published as a specimen, and to b paid for on delivery, those subscribers who design to continue to take th work are requested to signify it as early as possible to any of the publisher

---

NEW BOOKS.

For sale at the printing office of S. A. Elliot, Pennsylvania avenue, a *List* *all the Patents*, granted by the United States to April, 1823, with a *List of Boo* deposited in the Department of State to the same period—*Price 75 cents.*

Also, a valuable collection of *Specifications of Patents*, on many very importa subjects—*Price 75 cents.*

hed at the
cannot fail
this great
ely to im-
useful and
pe, strong
olicy, she
ornaments
man. To
progress
; and by
further at-

ns of Pat-
ery in the
taining ac-
. These
their sub-
he various
the work.
dence, for

lture, Ca-
; and im-
bituary of
teorologi-

ew words,
ation, en-
scientific
s and Re-
party, but

their spe-
y furnish,
an Artist
formation
Subscri-
in Wash-
numbers

and to be
take this
ublishers.

---

e, a *List of*
t of Books
important